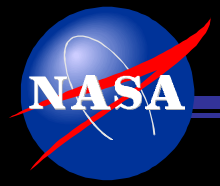


CODE 450 Mission Services Program

Mission Services Customer Forum

March 20, 2003

Goddard Space Flight Center
Greenbelt, Maryland

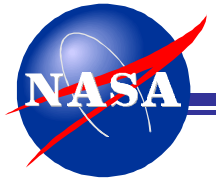
Agenda

1:00	**Opening**	
	• **Opening Remarks**	**A. Levine**
	• **Open Action Item Review**	**A. Levine**
1:10	**Open Floor - Customer Concerns/Issues**	
	• **TDRSS Name Switchover**	**R. Schonbachler**
	• **Security Issues**	**C. Emerson**
	• **Space Mission Communications & Data Services (SMCDS) Procurement**	**K. McCarthy**
1:40	**Featured Topics**	
	• **Integrated Design Capability**	**J. Martin**
	• **Space Network Web Services Interface**	**T. Sardella**

Agenda (cont'd)

2:15	**Systems Status Update**	
	• **GN**	**R. Clason**
	• **SN**	**K. Tasaki**
	• **FDF**	**T. Thompson**
	• **DSMC**	**B. Hudgins**
2:40	**Enterprise Updates**	
	• **Earth Science**	**P. Ondrus**
	• **Space Science**	**R. Sodano**
	• **Human Spaceflight**	**T. Sobchak**
2:50	**Launches (within L-1 yr) Status**	
	• **Loading/Resources Issues**	**D. Joesting/A. Levine**

A. Levine
Service Planning and Analysis Manager
Goddard Space Flight Center, Code 451



Action Item Review

MSCF Open Action Items

Action Item	Assignee(s)	Action	Status	Progress
MSCF-11-15-03	Michele Crizer (GSFC/LandSAT-7)/John Grassel (GSFC/CSR)	Update DMR and PSLA for Landsat-7.	Closed	The PSLA was updated; USGS does not feel that the DMR requires updating.
MSCF-11-15-04	All Projects	Ensure issues are raised sufficiently early to ensure that adequate time is available to address mission concerns (i.e., compatibility testing, requirements, etc.) and thus possibly avoid a need to form TIGER teams.	Open	This action item is for information only; the activity is ongoing.
MSCF-11-15-08	Service Providers	Provide a briefing for the next MSCF meeting.	Open	Completion of this action item is pending release of NASA RFPs related to the CSOC recompete and possibly commercialization. The network service providers have expressed interest in presenting at the MSCF.

MSCF Open Action Items *(cont'd)*

Action Item	Assignee(s)	Action	Status	Progress
MSCF-02-21-02	NISN (S. Douglas), SN (K. Tasaki), & CSOC Engineering (R. Nguyen)	Meet and determine the current status of the 4800-bit block versus IP problem, and how to move forward toward a solution.	Open	1. Set up a test lab to demonstrate a new NASA wide data service based on CCSDS SLE. • CSOC Houston under a SODA task procured and installed an interim SLE provider system at the Wallops Telemetry Development Microwave System Laboratory (Bldg E134) with following capabilities: • CCSDS SLE data services based on Avtec Telemetry Command Processor - Unframed Bit Stream data service over SLE based on Global Science and Technology R&D Air Force Satellite Control Network (AFSCN) project - Equipment was not connected to RF equipment or 5.4 Meter Antenna. - All 7 tests ran successfully at rates under 500Kbs. However, anomalies were encountered when downlink throughput rose above 500 Kbs. • They completed FY02 SLE provider and user data transfer testing using an interim SLE implementation at Wallops and Houston. 2. Establish the infrastructure required for interoperability testing between NASA ground station at Wallops and the Air Force Satellite Control Network (AFSCN). • The effort to establish an an infrastructure required for interoperability testing between NASA ground station at Wallops and the Air Force Satellite Control Network (AFSCN) is on-going. 3. CSOC/GSFC engineering is studying a possibility of transitioning front-end for ACE mission from Nascom Block interface to SLE. • CSOC/GSFC engineering is studying the impact for transitioning front-end equipment for Code S missions from Nascom Block interface to SLE. CSOC is coordinating with GMSEC to set up a SLE Service User in GMSEC lab for testing with SLE Service Provider at WFF. 4. Pending on funding availability in FY03, establish the infrastructure required for interoperability testing between NASA ground station at WSC and the Air Force Satellite Control Network (AFSCN). • Successful demonstration of new data service will promote the phasing out of Nascom block. Code 450 is having discussion leading to a position on new data service that would be used to phase out Nascom Block interface.

MSCF Open Action Items *(cont'd)*

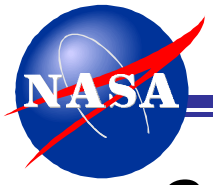
Action Item	Assignee(s)	Action	Status	Progress
MSCF-02-21-04	DSMC (C. Barclay) & Network Service Manager (A. Levine)	Discuss and recommend a process to address Interference Management priorities.	Open	Interfere analysis is in progress.
MSCF-02-21-05	SN (K. Tasaki & R. Schonbachler)	Determine a timeframe for final conversion to the new TDRS naming convention for the NCC/DSMC scheduling system.	Open	In process. Potentially impacted customers are being contacted to determine the their current status regarding conversion. The issue is being discussed at the 11/21/02 MSCF.

Open Floor - Customer Concerns / Issues

TDRSS

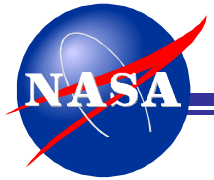
Name Switchover

R. Schonbachler
Special Projects and Missions
Goddard Space Flight Center, Code 451



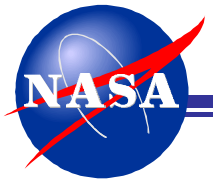
Current Status of TDRS Naming Convention Transition

- **UPS, SWSI, and NCCDS software system developers confirm that UPS, SWSI and NCCDS are ready to support**
- **FDF is ready to support**
- **Transition plan is being revised to incorporate a "variety" of scheduling and real-time systems**
- **EIF testing may be scheduled using the ANCC at WSC Terra and Aqua have successfully tested using the new naming convention**
  - Work through your Mission Commitment Manager to schedule EIF testing with the ANCC
    - Space Science MCM – Leslie Ambrose, 301-286-7767
    - Earth Science MCM – Lynn Myers, 301-286-6343
- **Transition Readiness Review (TRR) to be scheduled**
  - Transition date will be negotiated after the completion of the TRR
  - Identification of MOC Single Point of Contact for all Naming transition activities is requested
  - All MOCs will be notified of the TRR date, time and place



Security Issues

C. Emerson
Computer Security Official
Code 450



Sendmail Vulnerability

NASIRC BULLETIN B-03-23, FOLLOW-UP BULLETIN B-03-23-B

- **PROBLEM: Sendmail has released a fix for a critical security problem. Version 8.12.8 contains the fix.**

- **RECOMMENDATION: Due to the seriousness of this vulnerability, the NIPC is strongly recommending that system administrators who employ Sendmail take this opportunity to review the security of their Sendmail software and to either upgrade to Sendmail 8.12.8 or apply the appropriate patch for older versions as soon as possible.**

- **For more information, consult http://www-nasirc.nasa.gov/nasa/whats_new.html**

GSFC WWW Site Registration

- **Every site that is allowed through the firewall must be registered.**
  - This includes sites on:
    - The port 80 list
    - Port 443 (https)
    - Higher ports (8000, 8080, 5000, 10001, etc)
    - Other networks (Nascom, HST, ECS, etc.), so long as they are accessible outside that domain.
- **Register all public access systems by March 31 at:**
  - http://webregistry.gsfc.nasa.gov
- **WWW policy summary is available from:**
  - http://webmaster.gsfc.nasa.gov/

Security Points of Contact

Curtis Emerson
Computer Security Official for Code 450
Code 452 / Bld 12 Room E213
Voice 301-286-7670 / FAX 301-286-0328 or 1725
Email: Curtis.M.Emerson@nasa.gov

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CSOC GSFC Site Security Coordinator
Code 450.C / Goddard Corporate Park
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email: Julian.S.Scarborough.1@gsfc.nasa.gov

Cecilia Allen Czarnecki
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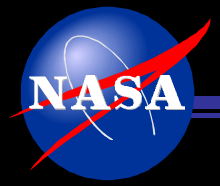
Pager: 877-461-0567

Patricia A. Coffen/Deputy
Information (IT) Security Manager
NASA/GSFC Security Office
Code 291 Building 12 Room E120
Voice: (301) 286-6051 / Fax: (301) 286-1723
Pager: 877-459-5176

Security Operations Center at 301-286-8661
If Center ITS personnel are unavailable, contact NASIRC directly.
1-800-7NASIRC (800-762-7472) FAX: 301-286-7483

24-Hour / Emergency:

1) Call 1-800-NEXGRAM (1-800-639-4726)
2) An operator will answer and ask for the name or number you are trying to reach
3) The group code name is "NASIRC" a

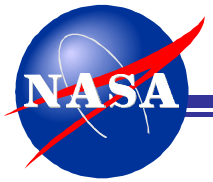


Space Mission Communications & Data Services (SMCDS) Procurement

450/Kevin McCarthy

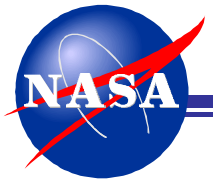
SCMDS General Information

- **NASA released the draft RFP for the Space Mission Communications and Data Services (SMCDS) acquisition on March 7, 2003. The draft RFP can be found here:**
  - http://prod.nais.nasa.gov/cgi-bin/eps/bizops.cgi?gr=D&pin=#104633
  - JSC and JPL work under CSOC are not part of this procurement
    - JPL will be a subcontract of the NASA contract with JPL
    - JSC will move under SFOC
  - Single solicitation with multiple awards (contracts managed at the individual Centers)



SCMDS General Information (cont'd)

- **The SMCDS solicitation includes five work packages**
  - Near Earth Networks Services (NENS) at Goddard Space Flight Center (GSFC)
  - Mission Operations/Mission Services (MOMS) at GSFC
  - KSC Integrated Communications Services (KICS) at Kennedy Space Center (KSC)
  - Huntsville Operations Support Center (HOSC) at Marshall Space Flight Center (MSFC)
  - Unified NASA Information Technology Services (UNITeS) at MSFC
- **The KICS and HOSC work packages are small business set-asides**
- **Offerors may propose "crosscutting" benefits to NASA**
  - Rules in Section L (proposal instructions)

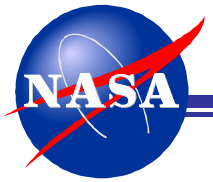


SCMDS General Information (cont'd)

- **Center evaluation of "work packages"**
  - NASA HQ is the source selection authority
  - Evaluation teams appointed
- **HQ evaluation of cross cutting proposals**
- **Source Selection Authority at HQ**

SCMDS General Information *(cont'd)*

- **SMCDS Current Schedule:**
  - Industry Briefing held on 12/18
  - Draft RFPs released on 3/7
  - Site Tours held on 3/12-14
    - NENS: Greenbelt, WFF, MILA/PDL, and WSC
    - MOMS: Greenbelt
    - Other work packages held site tours at this time also
  - Industry comment and question deadline is 3/21
  - Final release of RFPs schedule for 4/11
    - Proposals from industry scheduled for late May



MOMS Scope

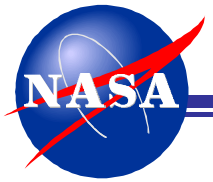
- **Flight Operations**
- **Mission Data Collection & Distribution (including EDOS)**
- **Mission Services Integration**
- **Systems Engineering & Development Tasks**
- **Flight Dynamics Support Services**
- **Flight Dynamics Systems Engineering**
- **Mission Analysis and Operations Support**
- **Systems Administration**
- **Mission operations and flight dynamics technology development and infusion**
- **Mission communications support (voice, video, network management**

NENS Scope of Work

- **Provides tracking and data acquisition for near-Earth customer missions**
  - Performs customer commitment management
  - Operates and maintains the Ground Network (GN)
  - Operates and maintains the Space Network (SN)
  - Performs sustaining engineering, logistics, facilities management, and hardware and software development
  - Customer commitment management
    - Develops and maintains customers' requirements and commitments documentation for the SN and GN, as well as for interfaces with other NASA and non-NASA networks
    - Performs modeling and loading studies to provide future mission feasibility, SN and GN workload, and advanced network architectural assessments
    - Performs testing and integration of customer missions with the supporting networks

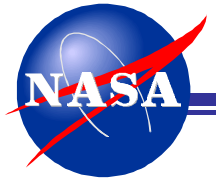
MOMS and NENS Contract Structure

- **MOMS is a CPAF contract (single award)**
  - All Indefinite Delivery, Indefinite Quantity (IDIQ)
  - Five year period with a two year option
- **NENS is a Cost Plus Award Fee Contract (single award)**
  - Core requirements and IDIQ
    - Core requirements are Program & Business Management and Space Network
    - IDIQ for Ground Network (inc. the Range), development, customer commitment support, etc.
  - Five year period--no option



MOMS and NENS

- **<u>Very</u> different from CSOC**
  - Lessons learned applied
  - Contract structures allows NASA a great deal of flexibility
- **Missions will have multiple contractor interfaces**
  - MOMS, NENS, UNITeS, DSN
- **More responsibility and authority for NASA and GSFC**



Featured Topics

Integrated Design Capability

An Efficient Approach to Mission Design

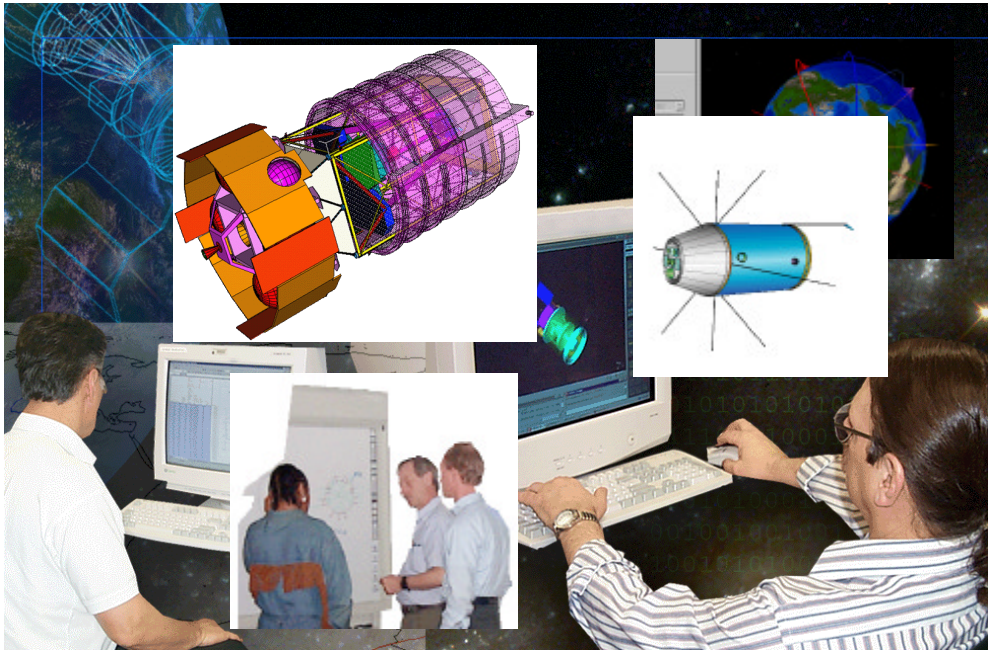
J. Martin

Agenda

- **Background**
- **Resulting Benefits**
- **Services Provided**
- **Processes Employed**
- **Products**
- **Statistics**

Why an Integrated Design Capability?

- **Previous process for mission concept design**
  - Too many meetings
  - Too many people
  - Too low on the priority totem pole
  - Tied up too many resources
  - Took too long to complete
  - Incomplete collaboration between disciplines
  - Inconsistent or non-convergent results
  - Infrequent interaction with the “customer”
  - Did not always meet customer needs or expectations



- **Current process resolves all these difficulties**

Structure and Mission Statement

Integrated Mission Design Center (IMDC)

Operational facility since fall 1997
Performed over 150 studies
http://imdc.nasa.gov

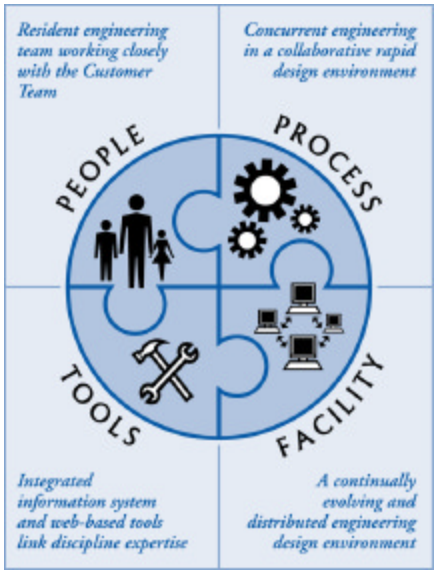
Instrument Synthesis & Analysis Laboratory (ISAL)

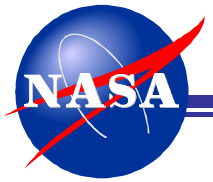
Operational facility since spring 1999
Performed over 40 studies
http://isal.gsfc.nasa.gov

IDC Mission Statement

Provide high-quality, rapid mission design and remote sensing concepts that meet or exceed the requirements in the most timely & cost effective manner

Include infusion of technology and processes to continually advance our ability to do design work and to extend value of product





Resulting Benefits

- **Provide proven state-of-the-art engineering, but in an updated manner**
  - Greatly accelerate time and reduce cost for development of end-to-end space mission and remote sensing conceptual designs
  - Allow the actual “hands on” involvement of the customer in the design process
    - Better chance of meeting customer needs or expectations
  - Facilitate concurrent engineering
    - All disciplines working together, and all at the same time
    - Consider all aspects of the mission life-cycle at the same time
  - Increase and improve the collaboration between subsystem disciplines
    - Infuse the end-to-end system perspective into the entire team
    - Improve product consistency, quality, and system level convergence
    - Improve technology infusion, especially for cross-discipline items

Accelerated development of state-of-the-art, end-to-end mission and instrument system concepts have been successfully demonstrated to be feasible and of significant value in an on-going operational environment

Services Offered

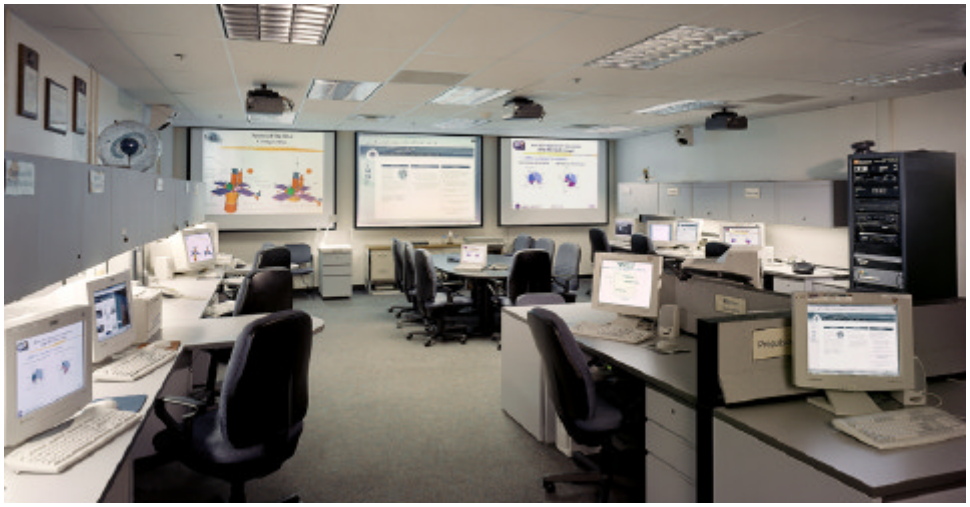
- **Serve a diverse group of customers**
  - All NASA centers and all NASA enterprises
  - Other Federal Agencies
  - Academia and research institutions, national and international
  - Industry, national and international
- **Diverse services custom tailored to customer needs**
  - End-to-end concept studies
  - Focused-studies
  - Independent technical assessments
  - Technology and risk assessments
- **Capable of supporting local and geographically distributed teams**
  - Have done studies with active collaboration from as many as 5 NASA centers simultaneously

Key Study Themes

- **Integrated Mission Design Center**
  - LEO, HEO, GEO, libration orbits, interplanetary and deep space, balloon flights
  - Single spacecraft missions, formation flying, constellations, distributed systems
  - Uncontrolled or controlled deorbit and recoverable payload modules
  - Expendable vs. non-expendable launch vehicles
  - Custom vs. commercial spacecraft tradeoffs
  - Nanosats to large satellites

- **Instrument Synthesis & Analysis Laboratory**
  - Imagers, Cameras
  - Spectrometers
  - Lidars
  - Cosmic Ray Telescopes
  - X-ray Telescopes
  - Solar Physics Instruments, Spectroheliographs
  - Passive or Microwave Radiometers
  - Infrared Cosmology Instruments and Telescopes
  - Optical Molecular Sensors
  - Planetary Orbiter Instruments
  - Large Weather Satellite Instruments

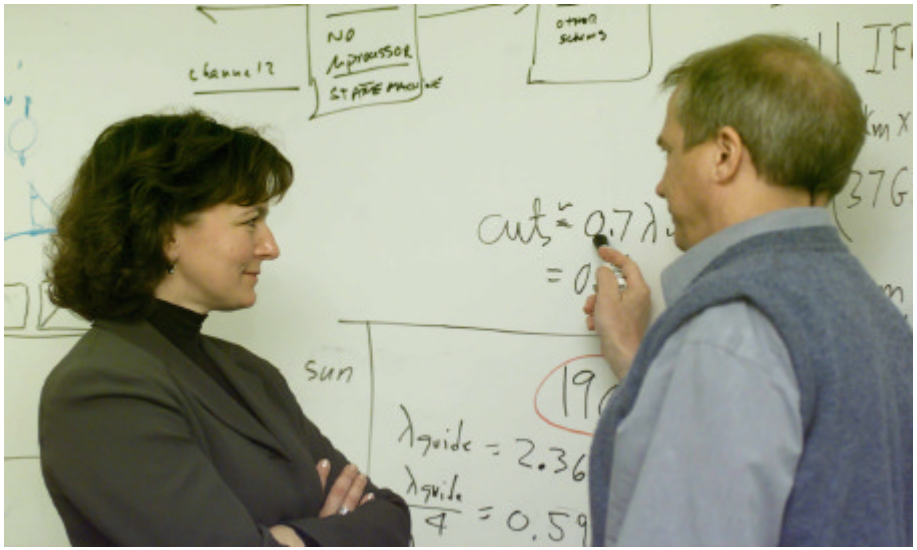
IDC Capabilities Broad, Diverse, Customer Driven



Integrated Mission Design Center

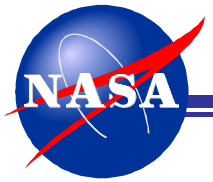
Systems	Power	End of Life Disposal
C&DH	Launch Vehicle	Mission Design/Orb Debris
ACS	Communications	Spacecraft Bus Assessment
Propulsion	Flight Software	Mechanical Design & Analysis
Thermal	Data Processing	Ground Systems & Mission Ops
Mission Success, Risk	Integration & Test	On-Orbit Servicing
Flight Dynamics Analysis	Radiation Environment	Costing

IDC Capabilities Broad, Diverse, Customer Driven



Instrument Synthesis and Analysis Laboratory

Systems	Thermal/Cryogenics	Electro-mechanical
Opto-Mechanical	Structures	Optical
Mechanical Analysis	Fine Guidance	Orbital Debris
Microwave Radiometry	Detectors	Electrical
Mechanical Design	Flight Software	Costing
Radiation Environment	Integration & Test	Mission Success, Risk



IDC Study Types Adapted to Customer Needs

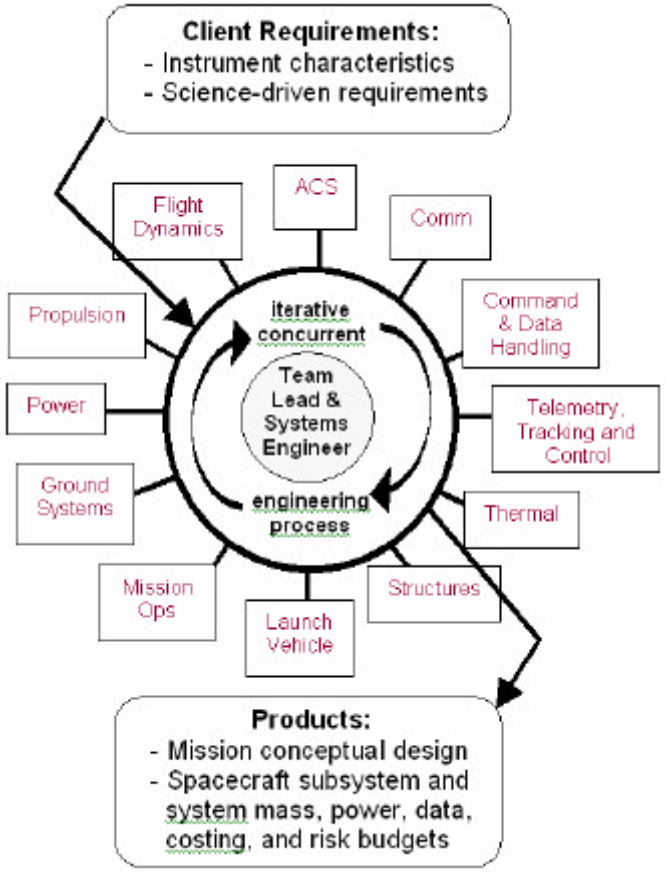
- **The IMDC performs studies to satisfy four distinct areas of customer needs:**
  - Mission concept design for a proposal effort
  - Mission concept design for early mission formulation
    - Validate the feasibility of a concept
    - Explore and trade multiple options
  - Mission concept design for future missions with advanced concepts
  - Special studies or system architecture trades
- **The four basic study types generally differ in analysis approach and products**
- **The system of collaborative and concurrent study approach used is essentially the same**

IDC Study Process Overview

- **Initial contact and scheduling**
  - 1-4 months prior to study date
- **Planning and preparation**
  - 1- 3 months prior to study execution
  - One or several face to face “Prework”meetings with the customer
  - IDC starts long duration tasks (if any) in time before study execution (e.g. orbit design for complicated missions)
- **Study execution is flexible**
  - IMDC, typically 4 or 5 day duration for end-to-end mission study
  - ISAL, typically 1 to 2 weeks for instrument design
  - Iterative, collaborative design sessions followed by presentation of final results to customer team
- **Study wrap-up**
  - 2-3 weeks following study execution

IDC Design Approach Tightly Coupled Iterative Process

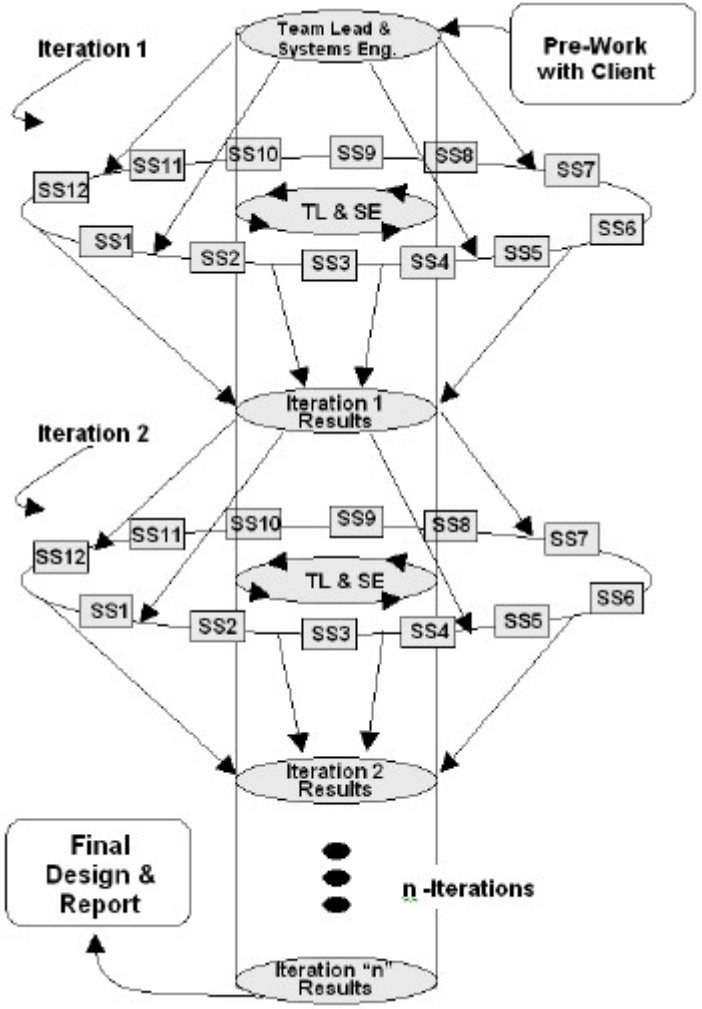
- **Integrated collaborative, concurrent design process**
  - Continuous intensive interactions between the Client, the Team Leader, the System Engineer, and the Discipline Engineers
  - Consider all phases of life-cycle
  - During the study, all parties exchange information in pseudo-real time with virtually all other parties
- **Active role of the Customer / Client**
  - A primary reason the process comes to closure so quickly, and results map well to customer needs



IMDC disciplines used as an example

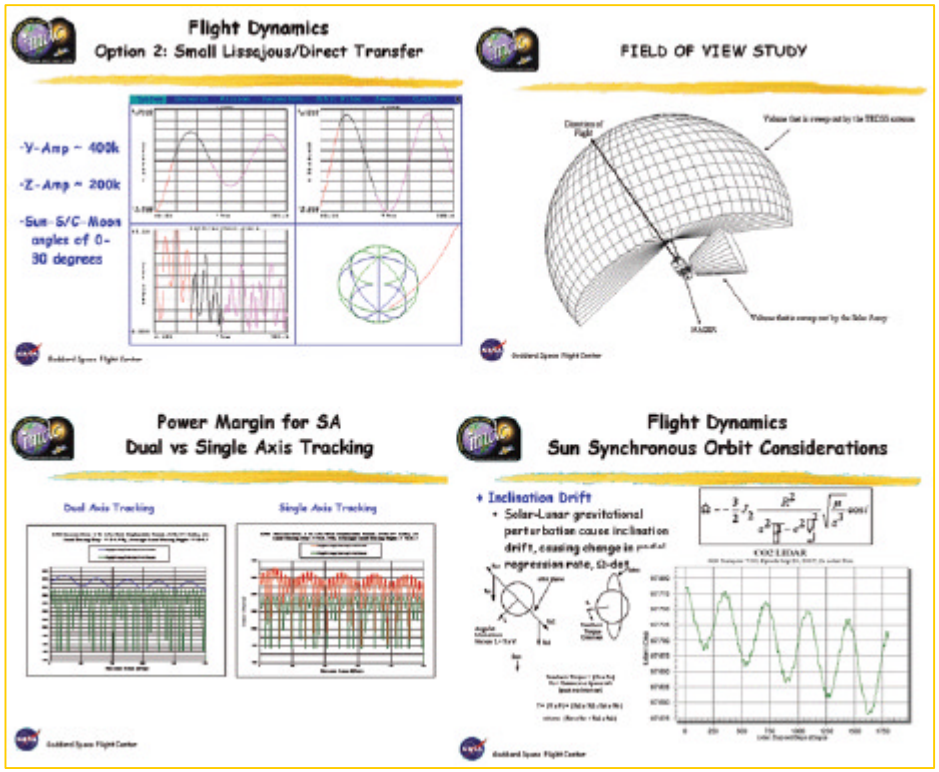
IDC Design Process

- Iteration 1a
  - Initial system requirements assessed through concurrent analysis
- Iteration 1b
  - The Customer and the IMDC engineering team work together to establish a straw man concept by collaborative synthesis
- Iteration 2
  - The straw man concept is gradually refined with subsystem and system dependencies incorporated in an iterative series of concurrent analyses and collaborative syntheses
- Iteration n
  - The iterations are repeated until the design converges into a coherent and consistent final mission concept baseline
- Conclusion
  - The process concludes when the final baseline design provides sufficient information to allow development of credible performance and cost models with contingencies



IDC Products - Broad, Diverse, Customer Driven

- **Operations Scenarios and Conceptual Designs**
- **System and Sub-system Requirements/Driving Requirements**
- **Identification of New Technologies/Risks/Issues/Future Work**
- **Mass, Power, & Cost Rack Ups**
- **Trades & Assumptions**
- **Mission Design**
- **Coverage Analysis/Link Calc**
- **Functional Block Diagrams**
- **Component Identification**
- **Analysis and/or Models**
  - Mechanical
  - Attitude Control
  - Electrical Power Systems
  - Propulsion
  - Thermal
  - Optical
- **Excel-based engineering tools**



IDC Statistics

IMDC Study Statistics

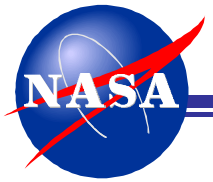
- **IMDC Study Characterizations**
  - ~40% Directed Mission Studies
  - ~40 % Competitive Proposal Support
  - ~20% Other
- **IMDC Customer Characterization**
  - >90% Goddard
  - >40% Returned for More Studies (same or other topics)

Year	Erth Sci	Sp Sci	Other	Total		% Tech
CY1997	4	9	0	13		15%
CY1998	11	20	1	32		6%
CY1999	6	9	7	22		18%
CY2000	14	13	4	31		16%
CY2001	12	14	1	27		7%
CY2002	11	19	3	33		39%
TOTALS	58	84	16	158		28
% by Type	37%	53%	10%			18%

ISAL Study Statistics

- **ISAL Study Characterizations:**
  - ~40% Directed Mission Studies
  - ~50% Competitive Proposal Support
  - ~10% Other
- **ISAL Customer Characterization**
  - >95% Goddard
  - >40% Returned for More Studies (same or other topics)

Year	Erth Sci	Sp Sci	Tech	Other	Total		% Tech
CY1999	0	1	0	0	1		0%
CY2000	4	5	0	0	9		0%
CY2001	9	6	0	0	15		0%
CY2002	12	3	4	0	19		50%
TOTALS	25	15	4	0	44		20%
% by Type	57%	34%	9%	0%			



Information Contacts

IDC (http://idc.gsfc.nasa.gov):

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IDC Capabilities & Integ Mgr:	Bruce Thoman/581, 301-286-3353
IDC Systems Engineer:	Mark Steiner/531, 301-286-5769

ISAL (http://isal.gsfc.nasa.gov):

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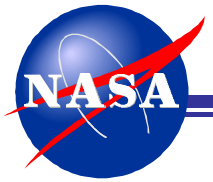
Science Liaison:	Dr. John Wood/551, 301-286-8278
Systems Engineer:	Michael Roberto/556, 301-286-4004

IMDC (http://imdc.nasa.gov):

Team Lead:	John Martin/451, 301-286-8892
Systems Engineer:	Gabe Karpati/531, 301-286-4468



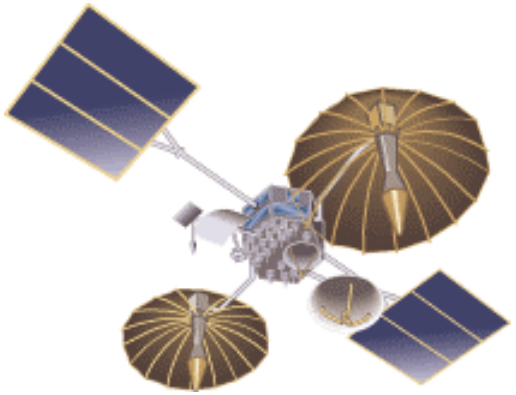
Conclusion

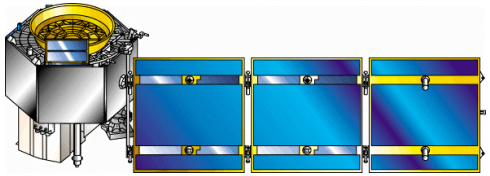
**“It is difficult to say what is impossible,
for the dream of yesterday
becomes the hope of today
and the reality of tomorrow.”**
Robert Goddard

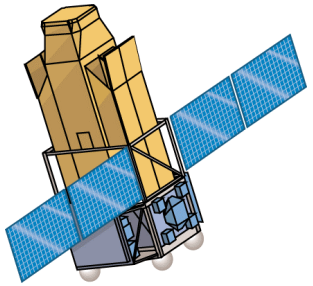
Using collaboration and concurrent thinking

Producing coordinated conclusions

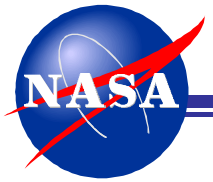
**The IDC is
Helping mission and science teams move from dreams to realities**





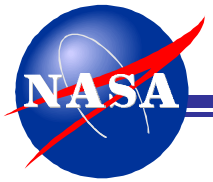


T. Sardella



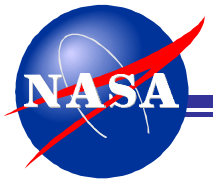
SWSI Overview

- **Customer Benefits**
  - Standards-based customer interface for performing TDRS scheduling, real-time service monitoring & control
  - Primary customer interface for Demand Access System (DAS) scheduling, service monitoring & control
  - Ideal for customers requiring low-cost solution for manual operations
  - Multi-mission support
  - Accessible from the Internet and NISN Open & Closed IONet
  - Secure access through encryption, certification, and authentication
  - Cross-platform compatible client application
  - Java-based Graphical User Interface (GUI)



SWSI Overview (cont'd)

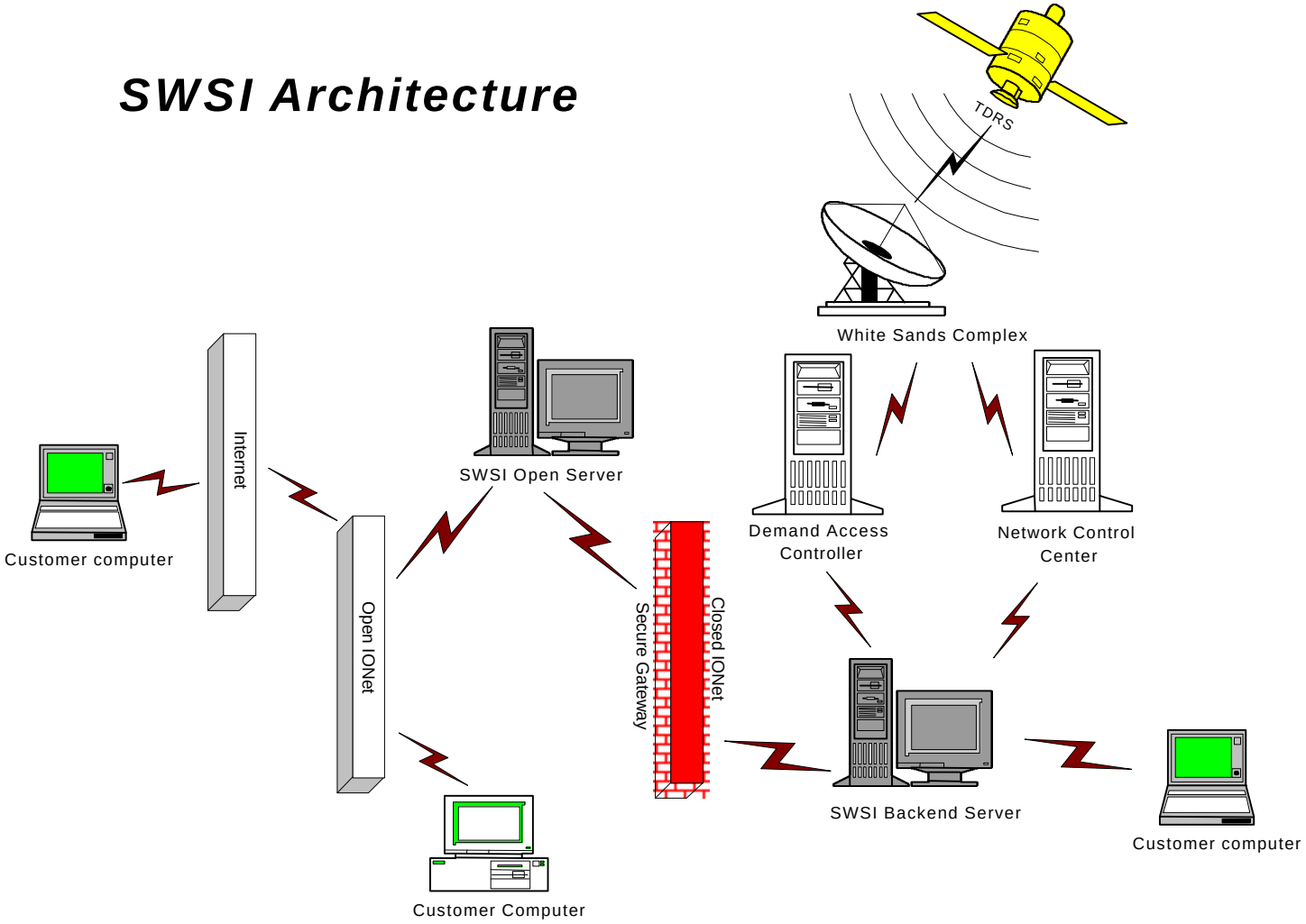
- **Capabilities**
  - Supports full NCCDS/Mission Operations Center (MOC) interface, including flexible scheduling
  - Ability to transmit customer state vectors to SN
  - Orbiting or stationary state vector generation based on user input of geocentric (position & velocity) or geodetic (latitude, longitude, & altitude) coordinates
  - Internet and Open IONet access to TDRSS Unscheduled Time (TUT)
  - Test mode for performing Engineering Interface (EIF) testing and user training



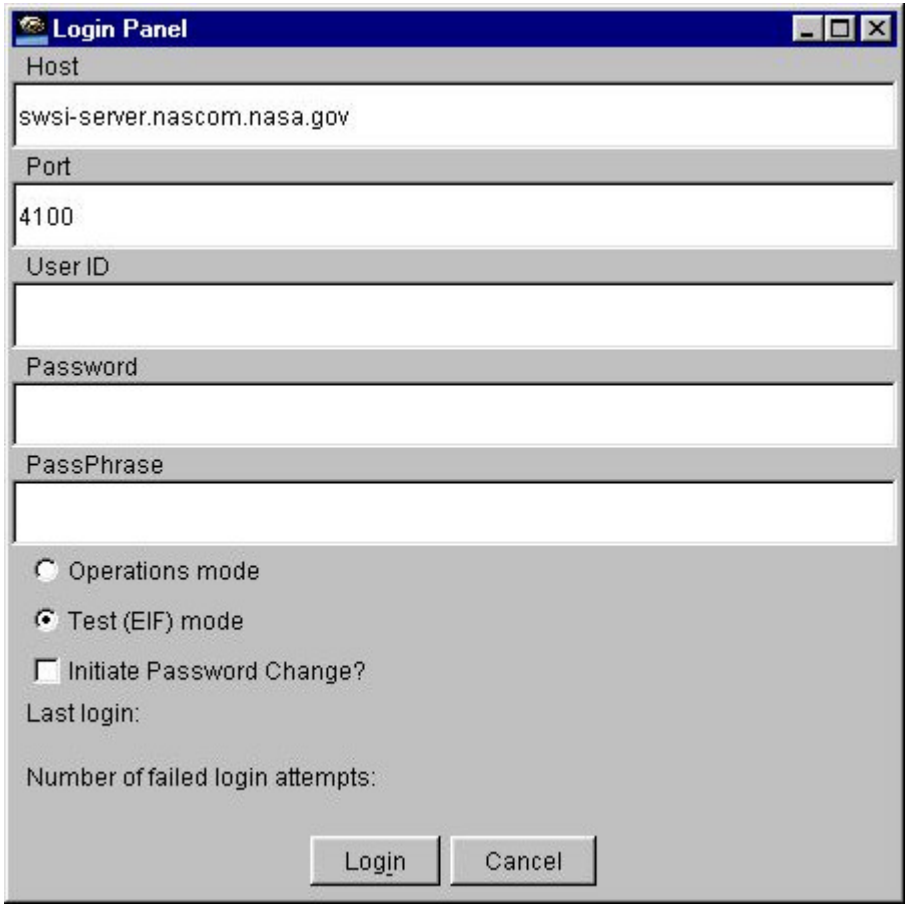
SWSI Overview *(cont'd)*

- **Client Requirements**
  - Sun Microsystems Java Runtime Environment (JRE) 1.4.1 (free)
  - Tested Operating Systems: Windows 98/NT/2000; Solaris 7,8; Linux
  - 128 MB RAM
  - 2 MB Disk Space (application size, excluding logs)
  - 1024x768 16 bit color display
  - Web browser to view TUT

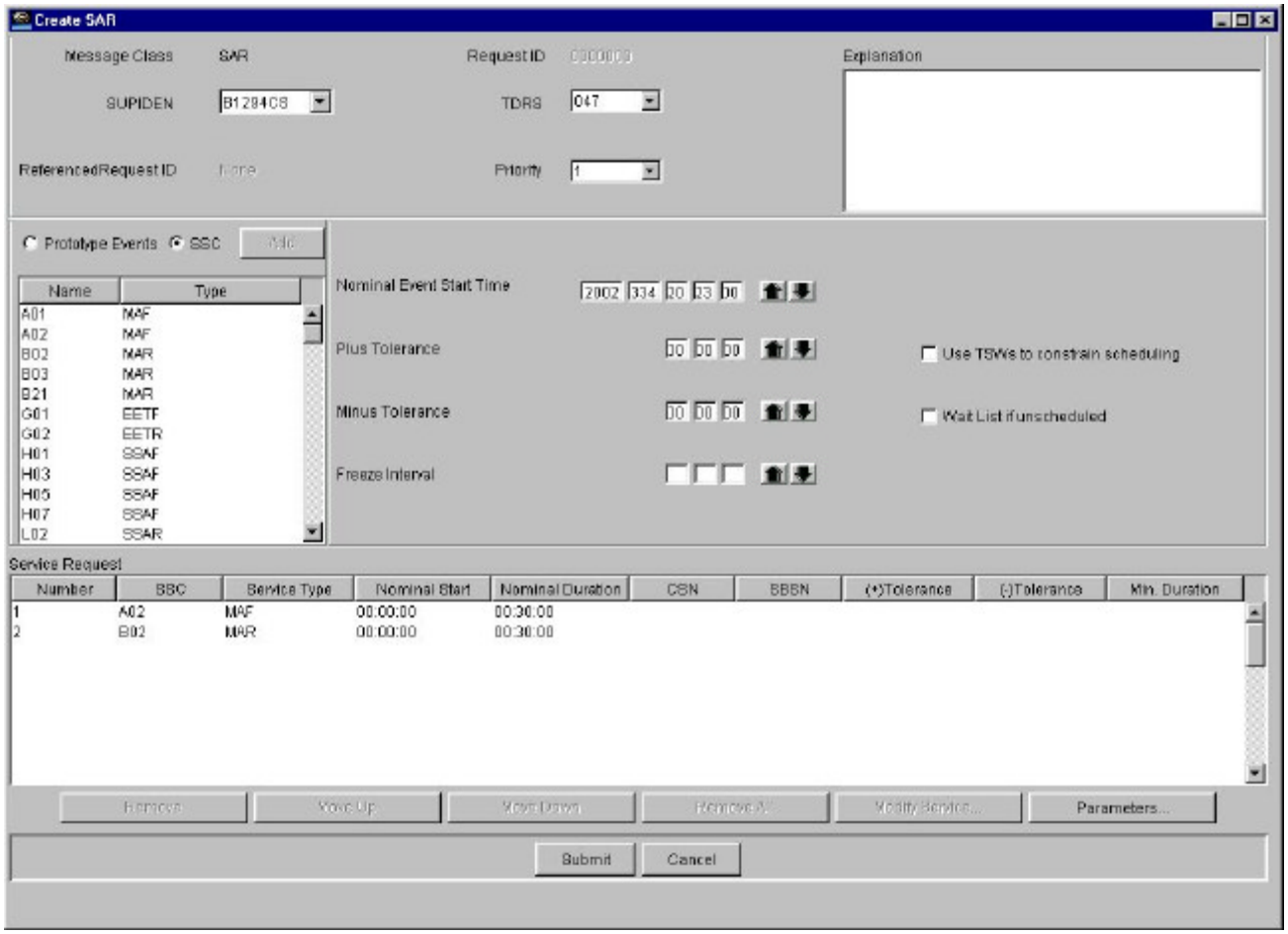
SWSI Architecture



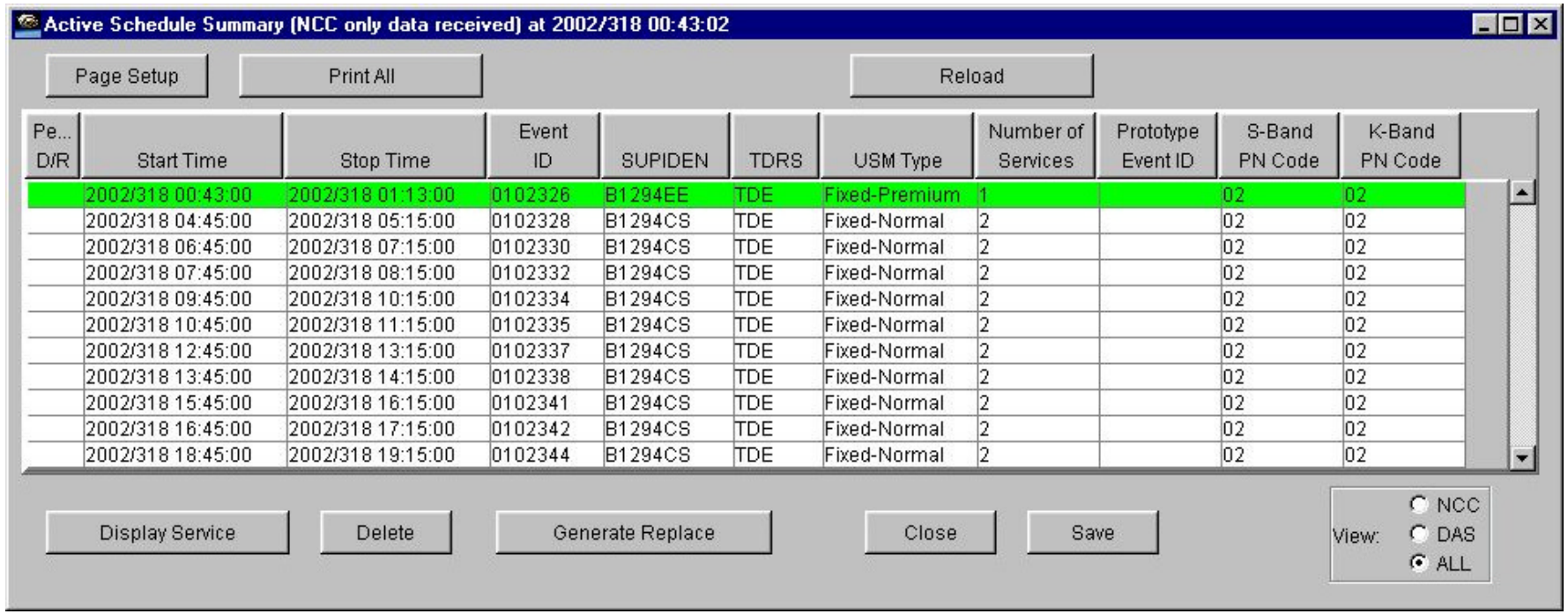
Client Login



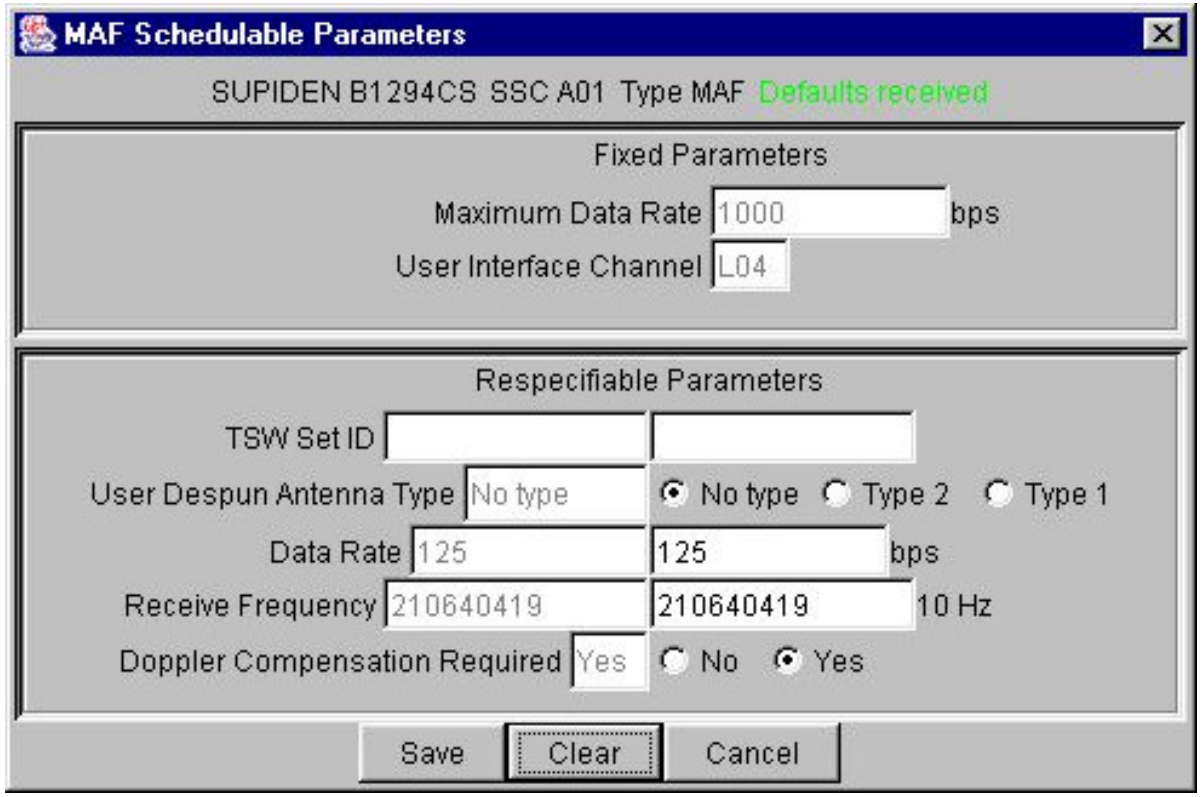
Scheduling a Legacy Service (SAR)



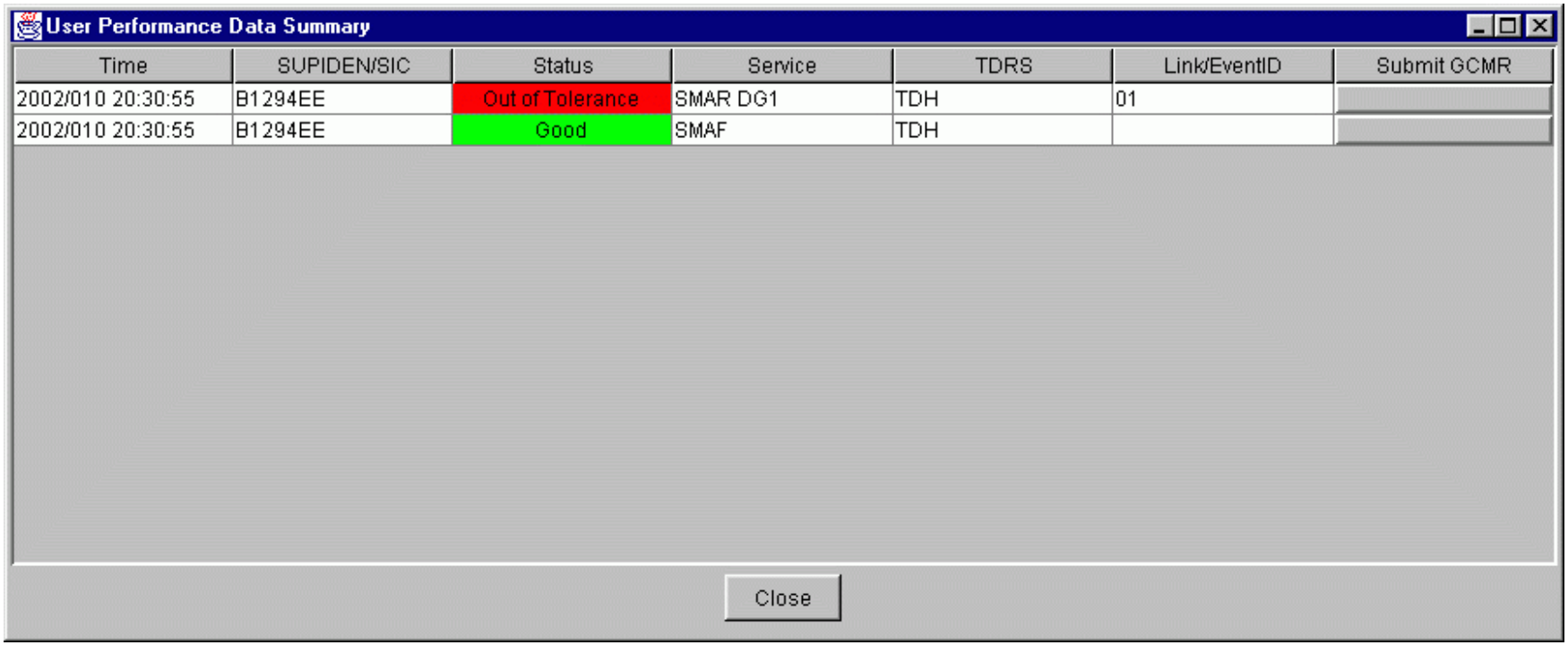
Confirmed Event Summary



Service Parameter Entry



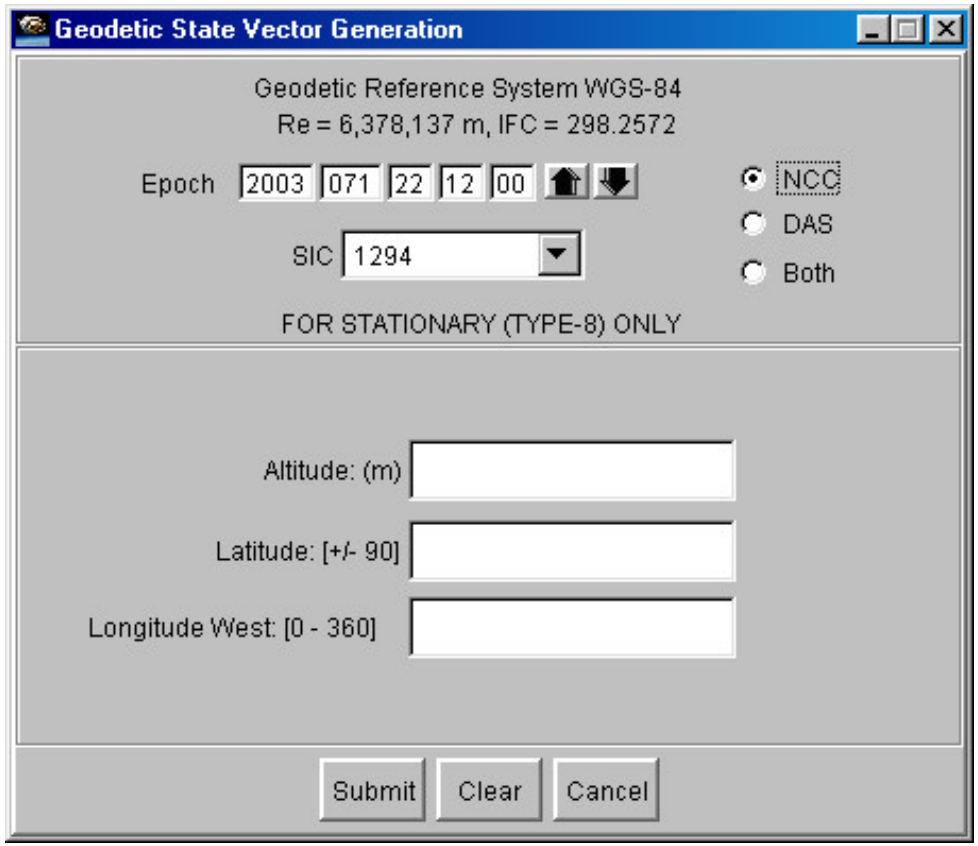
User Performance Data (UPD) Summary

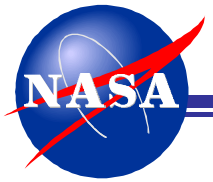


UPD Details


UPD: KSAF - STANDARD layout
File Edit Execution Layout
TDRS: TDE
Service Start Time: 2002/010 20:46:20
Link Number: 1
SIC: 1419
UPD Time: 2002/010 20:47:20
Status: Active
SUPIDEN: B1419CS
Azimuth: +90.0 deg
Elevation: +90.0 deg
Polarization: RCP
Signal EIRP: +00.0 dBW
Radiated Frequency: 13775.00000 MHz
Power Mode: Normal
Doppler Comp: On
PN Modulation: Yes
Clock Presence: Yes
Data Density: 56 %
Yaw: 000.0 deg
Roll: 000.0 deg
Pitch: 000.0 deg
Link Status: Pending

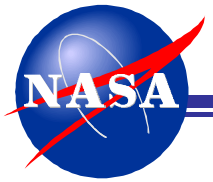
Geodetic State Vector Entry





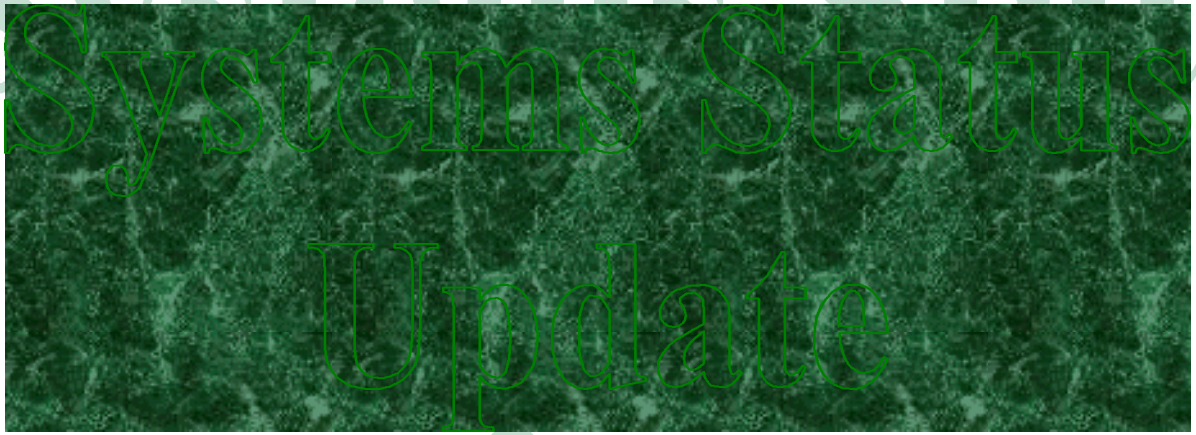
SWSI Current Status

- **Currently supporting DAS qualification and verification test activities**
- **Finalizing initial release to support legacy (NCC) services. Tentatively scheduled to be operational by June 1, 2003.**
- **Schedule for completion to include DAS interface still being assessed**
- **Support for limited operations provided by test servers located in Building 13, with manual scheduling via NCCDS scheduling operators as a backup**
- **Missions supported to date:**
  - Long Duration Balloon (LDB)
  - STS-107/CANDOS
  - Solar Radiation and Climate Experiment (SORCE)
- **Space Network Access System (SNAS)**
  - Follow-on effort will build on SWSI and incorporate User Planning System (UPS) functionality
  - Currently in Requirements Analysis with SRR in June 2003
  - Customer survey to be distributed March 31, 2003



SWSI Resources

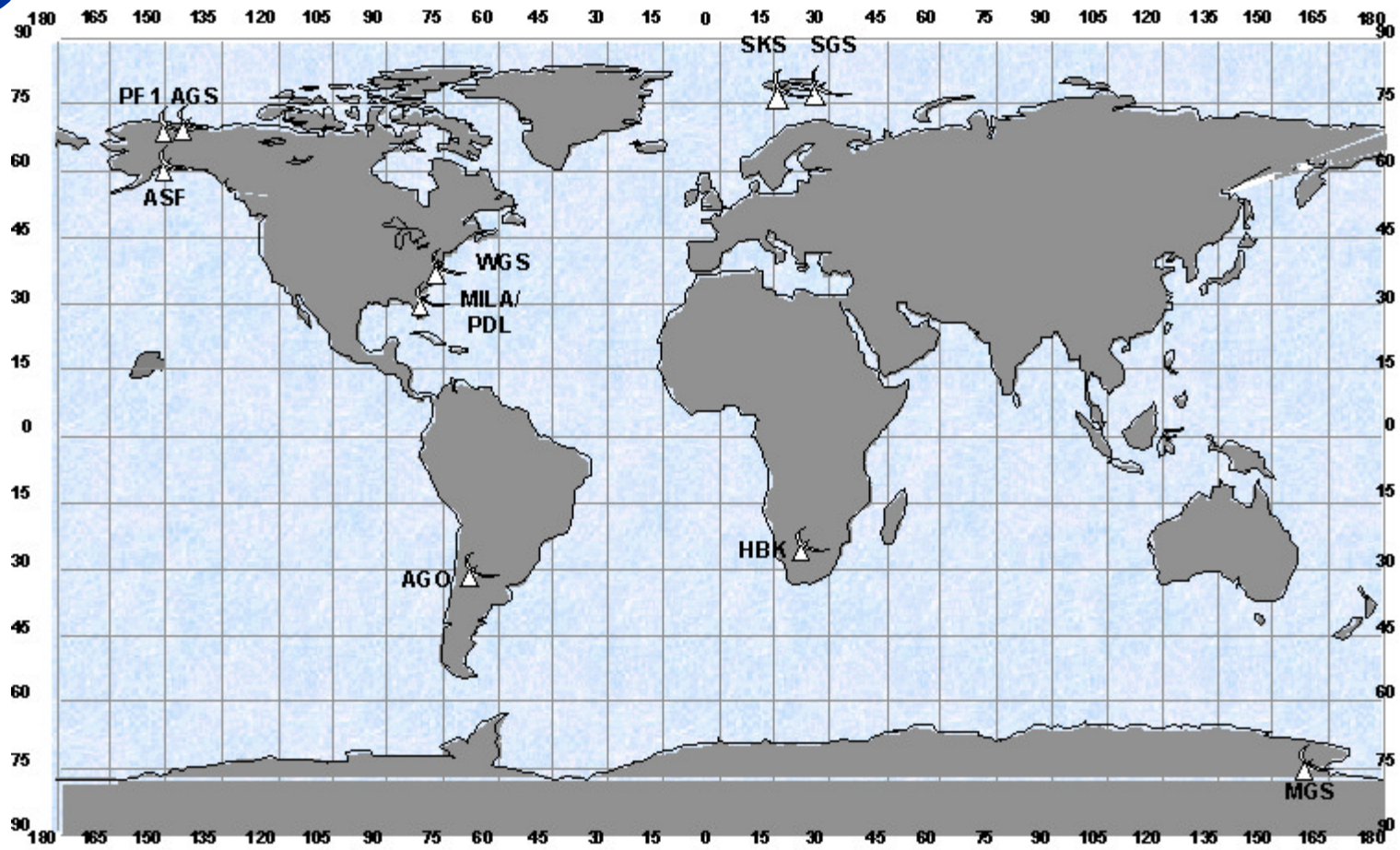
- **SWSI Web Page**
  - http://swsi.gsfc.nasa.gov/
  - Draft User's Guide online
- **Demonstration available on request**
  - Tom.Sardella@nasa.gov, 301-286-7686
  - Joe.Stevens@nasa.gov, 301-286-1557


Systems Status
Update

Ground Network

R. Clason

Current Ground Network Stations



AGO – Santiago Ground Station, Santiago Chile

AGS – Alaska Ground Station, Poker Flat Alaska

ASF – Alaska SAR Facility, Fairbanks Alaska

HBK - Hartebeesthoek Ground Station, South Africa

MILA/PDL – Merritt Island Launch Annex/Ponce De Leon, Florida

PF 1 – Poker Flat One, Poker Flat Alaska

MGS – McMurdo Ground Station, Antarctica

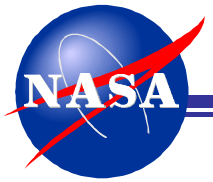
SGS – Svalbard Ground Station, Svalbard Norway

SKS – Svalbard Kongsberg Station, Svalbard Norway

WGS – Wallops Ground Station, Wallops Island Virginia

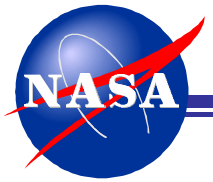
Station Assets

- **AGO (owned & operated by the University of Chile)**
  - 9-Meter S-Band FWD, RTN, TRK
  - 12/7-Meter S-Band FWD, RTN, TRK
- **AGS (owned by NASA, operated by CSOC)**
  - 11-Meter S-Band FWD, RTN, TRK, X-Band RTN
  - 8-Meter (TOTS) S-Band FWD, RTN, TRK
  - 5-Meter (LEO-T) S-Band FWD, RTN
- **ASF (owned by NASA, operated by the University of Alaska)**
  - 11-Meter X-Band RTN
  - 10-Meter X-Band RTN



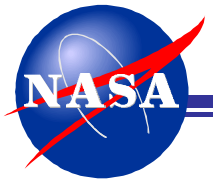
Station Assets (cont'd)

- **HBK (owned and operated by SAIC)**
  - 10-Meter S, L, & X-Band FWD, RTN
  - 12-Meter S & L-Band FWD, RTN
- **MILA/PDL (owned by NASA, operated by CSOC)**
  - Two 9-Meter S-Band FWD, RTN, TRK
  - 4.3-Meter S-Band FWD, RTN, TRK
- **MGS (owned by NASA, operated by CSOC)**
  - 10-Meter S-Band FWD, RTN, X-Band RTN
- **PF1 (owned & operated by DataLynx)**
  - 11-Meter S-Band FWD, RTN, X-Band RTN



Station Assets (cont'd)

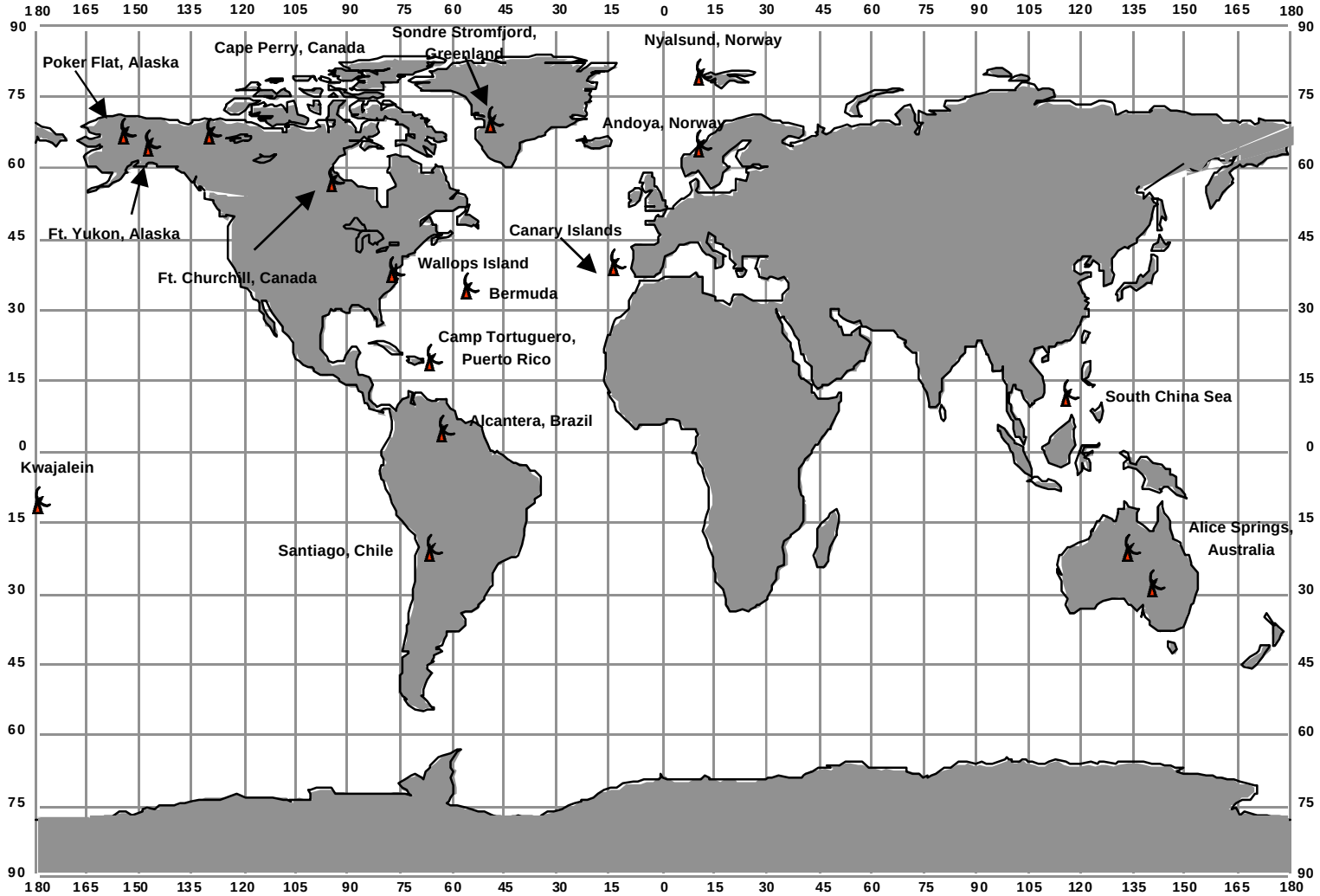
- **SGS (owned by NASA, operated by the Norwegian Space Centre)**
  - 11-Meter S-Band FWD, RTN, X-Band RTN
- **SKS (owned and operated by the Norwegian Space Centre)**
  - 11-Meter S-Band FWD, RTN, X-Band RTN
- **WGS (owned by NASA, operated by CSOC)**
  - 11-Meter S-Band FWD, RTN, TRK, X-Band RTN
  - 9-Meter S-Band FWD, RTN, TRK
  - 8-Meter (TOTS) S-Band FWD, RTN, TRK
  - 5-Meter (LEO-T) S-Band FWD, RTN



Station Assets (cont'd)

- **Current Mission Customers**
  - FAST, GRACE, Jason-1, OrbView-2, QuikSCAT, RHESSI, SAMPEX, SNOE, SWAS, TOMS-EP, TRACE, ACRIMSAT, CHAMP, SAC-C, Aqua, EO-1, ERS-2, LandSat-7, RadarSat-1, Terra
- **Future Mission Customers**
  - ADEOS-II, CHIPSat, ICESat, SORCE, SRTF, ProSEDs, Gravity Probe-B

Wallops and Remote Ranges



Sub-Orbital Services

- **Mission Control and Data Reduction**
  - Services – Wallops and Remote Ranges
    - Pre-mission simulation
    - Processing and display of trajectory and impact prediction data
    - Processing and display of vehicle performance data
    - Data backup and archiving
  - Systems include Encore super-mini's, 486 PCs, and Silicon Graphics workstations

Sub-Orbital Services (cont'd)

- **Optical, Photographic, and Video**
  - Services – Primarily Wallops
    - Film, print, and video processing
    - Range Safety support (video)
    - Post launch analysis (e.g., failure analysis)
    - Project documentation (e.g, fabrications and test)
    - Administrative documentation
  - Equipment
    - Tracking facilities
    - Cameras, accessories, and studio equipment

Sub-Orbital Services (cont'd)

- **Meteorological**
  - Services – Wallops only
    - Weather forecasting
    - Collection of upper air and surface weather data
    - Collection of ozone data
  - Systems
    - AWIPS and ASOS network stations
    - Ionosphere sounding station
    - Surface weather sensors
    - Lightning detection systems
    - Ozone measurement systems
    - Data systems

Sub-Orbital Services *(cont'd)*

- **Telecommunications**
  - Services – Wallops and remote ranges
    - Telemetry
    - Voice
    - Timing
    - Command Destruct
  - Wallops fixed systems
    - 7.3-Meter S-Band FWD, RTN, TRK, L-Band RTN (MGTAS)
    - Two 10-Ft L/S-Band RTN, UHF FWD (LGTAS & MTAS)
  - Poker Flat fixed systems
    - 9.1-Meter S-Band RTN (Redstone)
    - 16-Ft L/S-Band RTN
    - 8-Ft L/S-Band RTN
  - Mobile systems
    - 18-Ft S-Band RTN
    - 20-Ft L/S-Band RTN
    - 7-Meter L/S Band RTN

Sub-Orbital Services *(cont'd)*

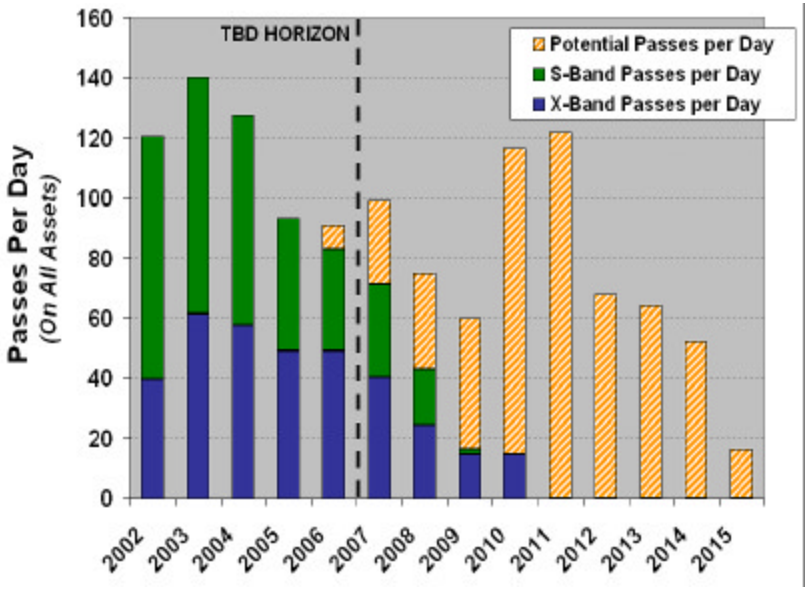
- **Radars**
  - Services – Wallops and remote ranges
    - Tracking
    - Research (Atmospheric Science Research Facility)
    - Range Safety Surveillance
  - Wallops fixed systems
    - Tracking
      - Radar 3 (Island Radar)
      - Radar 18 (Airport Radar)
      - Radar 5 (FPQ-6)
    - Research
      - 18-Meter UHF
      - 18-Meter S-Band
    - Surveillance
      - ASR-7 (Air Traffic Control Beacon System)
      - Pathfinder (Range Safety surveillance)
  - Poker Flat
    - Pathfinder (Range Safety surveillance)
    - Radar 10 (tracking)
  - Mobile and transportable
    - Radar 2
    - Radar 8
    - Radar 11

Ground Network Project Mission

- **Project Charter**
  - Provide base ground network capacity for NASA Missions
- **Project Objectives**
  - Provide ground network services reliably to meet customer requirements
  - Minimize costs
  - Avoid large (>$1M) capitalization costs to NASA
  - Minimize Ground Network Project civil servant staffing

Customer Requirement Trends

- **High Rate (X-Band & Ka-Band) Services**
  - Firm Polar Ground Network X-Band requirement for EOS through Aura (2010)
  - Firm Alaska SAR Facility/Wallops X-Band requirement for ADEOS II (2007)
  - Remaining currently identified high rate missions will use other networks
    - Solar Dynamics Observatory – Dedicated
    - LandSat Data Continuity Mission – Commercial
    - NPOESS Preparatory Project – NOAA
    - NPOESS – SafetyNet (Custom)
- **Low Rate (S-Band) Services**
  - Generally decreasing requirements through 2009 due to fewer missions flying
  - Fluctuating load within decreasing trend due to shorter mission durations
  - Possible constellation requirements beyond 2010 (GEC, MC Draco)
- **Shuttle Services**
  - Stable requirements through 2020

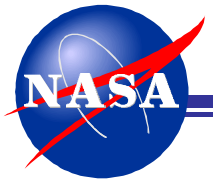


Current GN Capacity

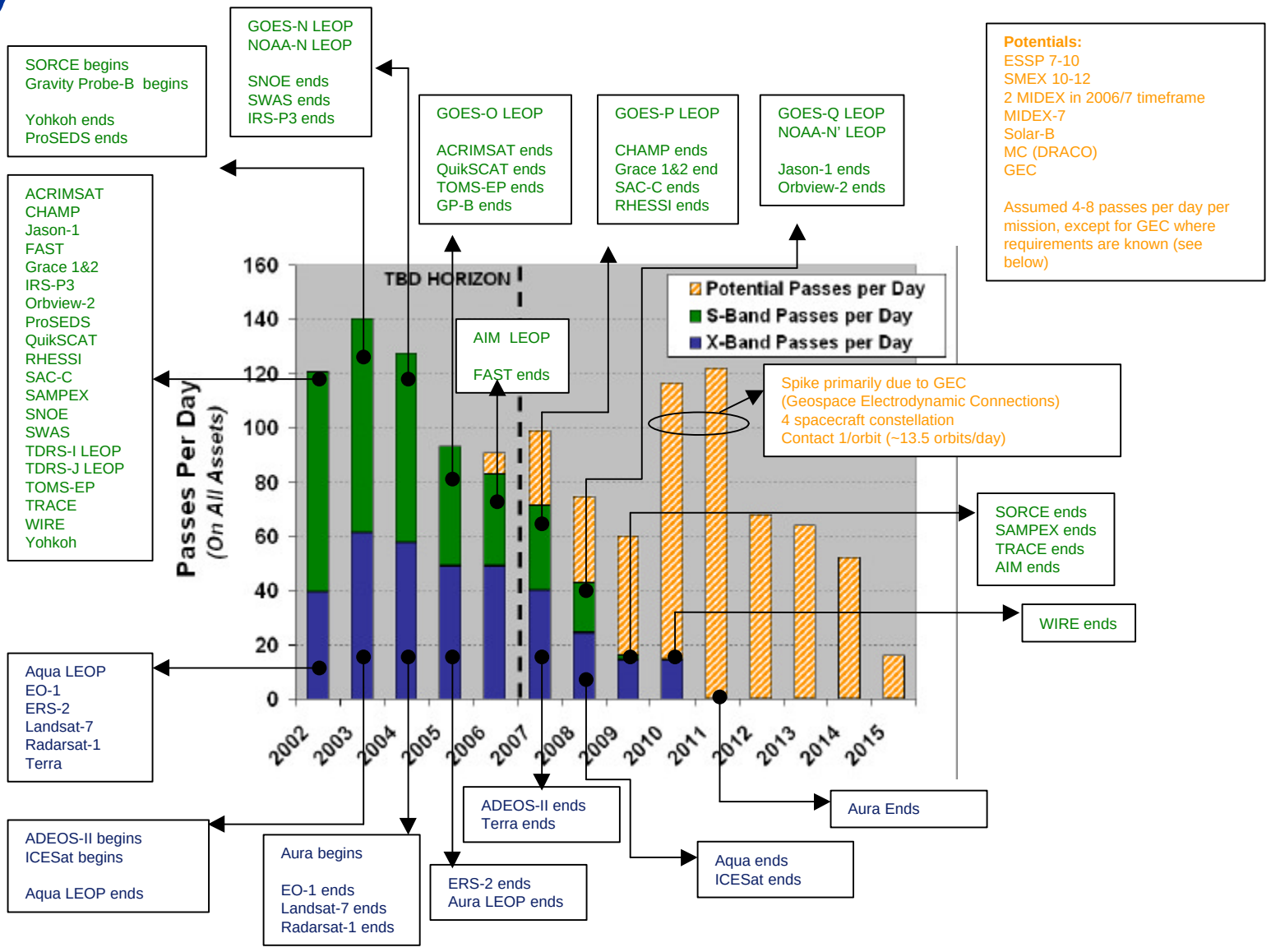
- **More than 275 passes/day NASA owned**
- **40 passes/day minimum on commercial**
- **The GN has capacity to meet all currently identified requirements**

Service Provider Trends

- **NASA**
  - Number of missions using both the SN and GN will continue to increase with the availability of the SN Demand Access System (DAS)
  - Use of the DSN for LEOP and transfer orbit support will continue to decrease as limited resources are focused on deep space missions
- **NOAA**
  - Current Fairbanks and Wallops stations have ample X and S Band contingency capacity
  - NPOESS contract includes custom Ka-Band network (SafetyNet) to be operational in 2009
- **DoD**
  - Moving toward an Integrated Satellite Control Network (ISCN) in the mid term
  - Also exploring new space based infrastructure concepts Transformational Communications Architecture for the long term
- **Commercial**
  - Large market for commercial ground network services has yet not developed
  - Some commercial service providers maintain business viability in the transfer orbit and remote sensing niche markets (e.g., Universal Space Network, HBK)
  - Other commercial service providers rely on NASA as their cornerstone customer while they seek to develop a broader market (e.g., DataLynx, University of Chile)
- **Partners**
  - Some NASA missions will continue to receive ground network services from University and International partners

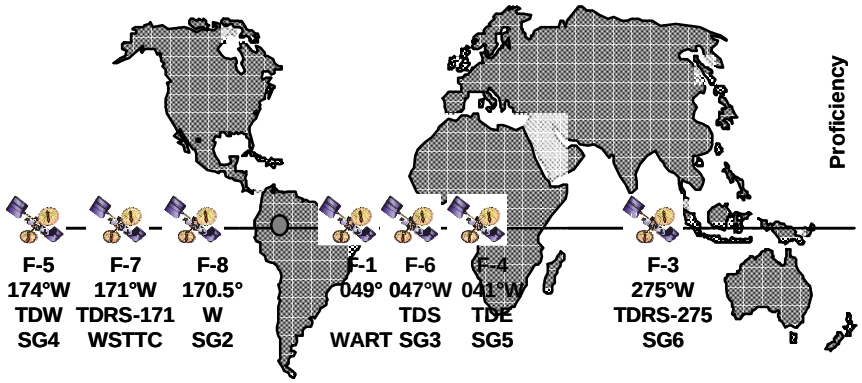


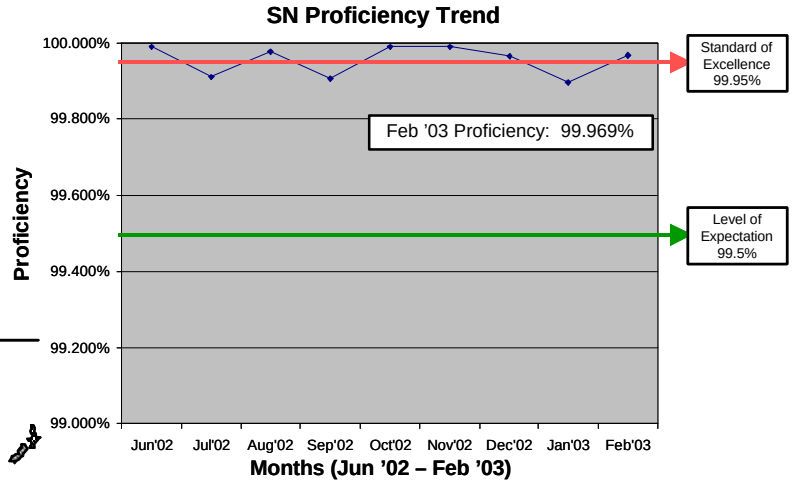
Back Up

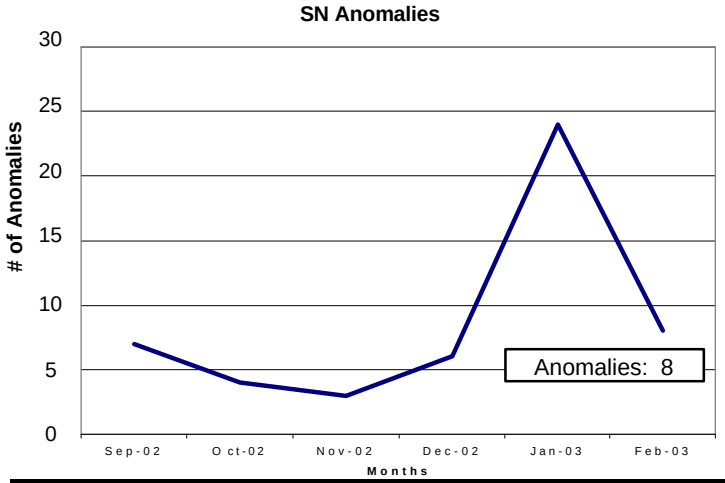

SORCE begins
Gravity Probe-B begins
Yohkoh ends
ProSEDS ends
GOES-N LEOP
NOAA-N LEOP
SNOE ends
SWAS ends
IRS-P3 ends
GOES-O LEOP
ACRIMSAT ends
QuikSCAT ends
TOMS-EP ends
GP-B ends
GOES-P LEOP
CHAMP ends
Grace 1&2 end
SAC-C ends
RHESSI ends
GOES-Q LEOP
NOAA-N' LEOP
Jason-1 ends
Orbview-2 ends
Potentials:
ESSP 7-10
SMEX 10-12
2 MIDEX in 2006/7 timeframe
MIDEX-7
Solar-B
MC (DRACO)
GEC
Assumed 4-8 passes per day per mission, except for GEC where requirements are known (see below)
ACRIMSAT
CHAMP
Jason-1
FAST
Grace 1&2
IRS-P3
Orbview-2
ProSEDS
QuikSCAT
RHESSI
SAC-C
SAMPEX
SNOE
SWAS
TDRS-I LEOP
TDRS-J LEOP
TOMS-EP
TRACE
WIRE
Yohkoh
TBD HORIZON
Potential Passes per Day
S-Band Passes per Day
X-Band Passes per Day
Passes Per Day
(On All Assets)
160
140
120
100
80
60
40
20
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
AIM LEOP
FAST ends
Spike primarily due to GEC
(Geospace Electrodynamic Connections)
4 spacecraft constellation
Contact 1/orbit (~13.5 orbits/day)
SORCE ends
SAMPEX ends
TRACE ends
AIM ends
WIRE ends
Aqua LEOP
EO-1
ERS-2
Landsat-7
Radarsat-1
Terra
ADEOS-II ends
Terra ends
Aura Ends
ADEOS-II begins
ICESat begins
Aqua LEOP ends
Aura begins
EO-1 ends
Landsat-7 ends
Radarsat-1 ends
ERS-2 ends
Aura LEOP ends
Aqua ends
ICESat ends

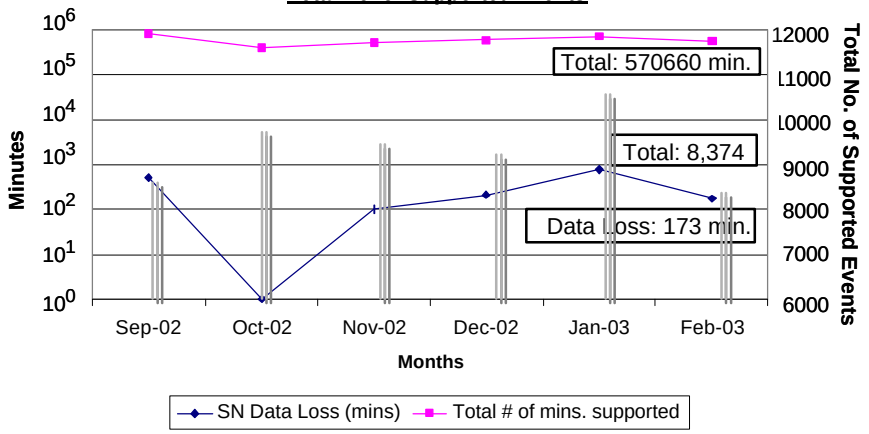

Space Network
Keiji Tasaki
SN Project Manager
Goddard Space Flight Center
Code 452

SN At A Glance









Missions	Total No. of Supported Events	Anomalies	Service Stat.	Proficiency (%)	Standard of Excellence (%)
Aqua, ERBS, FUSE, HST, ISS, L-7, SP&M, TERRA, TOPEX, TRMM, UARS, XTE, EO-1, SORCE, LDBP	8,374	8	9,514 hrs. sched 9,511 hrs. actual 2 hrs. 53 min. lost	99.969%	99.99%

Overall TDRSS Constellation Management
Draft Timeline (future)

assumes TDRS-10 accepted before TDRS-9

TDRS-10 On-Orbit Testing Completion

TDRS-10 Acceptance

TDRS-7 Initiate Drift to 79W

TDRS-10 Initiate Drift to 171W

TDRS-10 On Station at 171W

TDRS-10 Transition to Operations (from TDRS-8)

TDRS-7 On Station at 79W

TDRS-8 Initiate Drift to 62W

TDRS-9 Acceptance

TDRS-9 Initiate Drift to 171W

TDRS-9 On Station at 171W

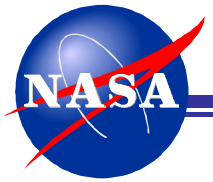
TDRS-9 Transition to Operations (from TDRS-10)

TDRS-10 Drift to 46W

TDRS-7 Drift to 171W

TDRS-7 On Station at 171W

TDRS-10 On Station at 46W



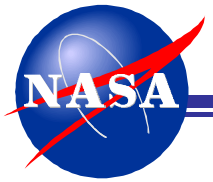
Technology and Upgrades

- **Ultra High Rate Ka-Band User Services**
  - OBJECTIVE: To provide a full data relay capability at >1 Gbps using the 650 MHz wide band channel associated with F8, TDRS-I and J at Ka-Band by FY06
    - ORR for 650 MHz Return IF Service and SNIP frequency compat. For 225 MHz return Service
    - RFI1 – Max data rate char., RFI2 – Flight and Ground hardware
    - Analysis of 600 Mbps demo results; additional experiments
    - Continued with the system engineering toward developing an draft ops concept by April

Technology and Upgrades (cont'd)

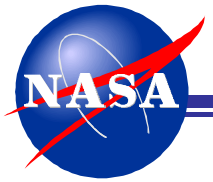
- **Demand Access System**
  - OBJECTIVE: To provide continual on-demand low-rate return service via MA
    - Software effort in the final stages
    - Targeting March 31 for qualification test start
    - WSC DAS testbed installed and successfully flowed data via TDRS
- **Space Network Web Services Interface (SWSI)**
  - OBJECTIVE: To provide SN customers with a standards-based and readily available Web interface that allows them to acquire SN services by interfacing with the NCCDS or DAS
    - Currently in Integration and Test
    - Release 1 (NCCDS) ORR June 03
    - Release 1.1 (DAS) coincides with DAS ORR
    - Current customers (operations): LDBP, CANDOS, SORCE

T. Thompson
Flight Dynamics Facility
Consolidated Space Operations Contract



Changes to DSN Interface

- **DSN TRK-2-34 Tracking Data Format**
  - Implementation is complete
  - Discrepancies between new format and TRK-2-15 format have been resolved
  - Successfully used for post-maneuver orbit determination for Wind
- **Spice/SPK ephemeris files**
  - Replaces current FDF site view product delivered to DSN schedulers
  - Missions affected are ACE, POLAR, SOHO, and WIND
  - FDF has implemented capability to generate Spice/SPK files using JPLs SPICE toolkit
  - Currently testing with JPL

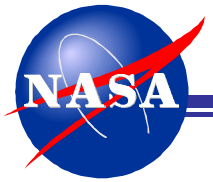


FDF Move Status

- **First Phase**
  - Establish a single string backup capability in building 13
  - String will be capable of supporting most FDF functions
  - No personnel will move
  - December 2003 is the planned completion date
- **Second Phase**
  - Move a second string to building 13 and make it the prime facility
  - Move personnel
  - A single string will be left in building 28 and it will become the backup
  - No scheduled completion date as yet

Data Service Management Center

B. Hudgins
Consolidated Space Operations Contract

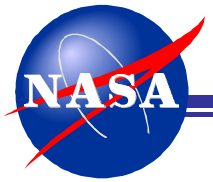


DSMC Status

- **All Data Services Management Center (DSMC) system and functional transitions have been completed.**

- **One open security issue is being worked. The current DSMC WOTIS configuration is not in compliance with NISN closed IOnet security protocol. A temporary security waiver has been granted to allow GN scheduling operations to continue until this issue is corrected. The anticipated completion date to bring the configuration into compliance is June 30th.**

- **The SN operational functions, i.e. ops interface activities, vector management for routine missions, ELV and STS launches and scheduling operations transitioned from the NCC to DSMC with no significant problems. Current operations for all of these functions continues to run very smoothly with no major system problems and very few operator errors.**



DSMC Status (cont'd)

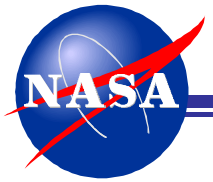
- **The GN scheduling operations transitioned from the Wallops Flight Facility to DSMC in three stages, Legacy customers and resources, STS and 9 Meter customers and Automated customers and resources. The first two transitions took place with no significant problems and current scheduling operations for these Legacy and 9 Meter customers continues to run with relatively few problems.**

- **The Automated transition and scheduling operation has proved more difficult. Training for the automated scheduling stage was hindered by the events of 9/11, which interrupted the travel plans of the trainer. Training was performed through telephone and e-mail coordination with the automated customers and Wallops personnel. The ORR was completed in August of 2002 and the transition took place in September of 2002.**

- **Impacting GN scheduling operator errors have accounted for less than .1% of the total GN data in each month since the transition, except for December 2002, when a high level of training was ongoing, causing the error rate to rise to 1.2%.**

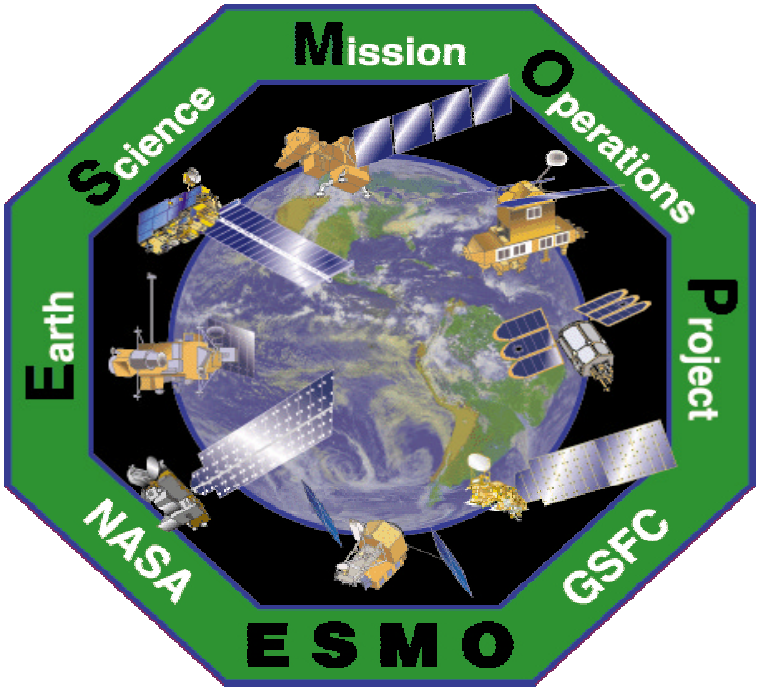
- **To reduce the error rate, training activities are continuing, customer communication meetings are being held and off-line improvements to the system have been implemented.**


NASA
CODE 450
Mission Services Program
Enterprise Updates



Earth Science

Earth Science Mission Operations (ESMO) Project

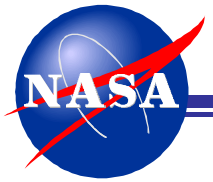


Paul J. Ondrus

March 20, 2003

Code Y

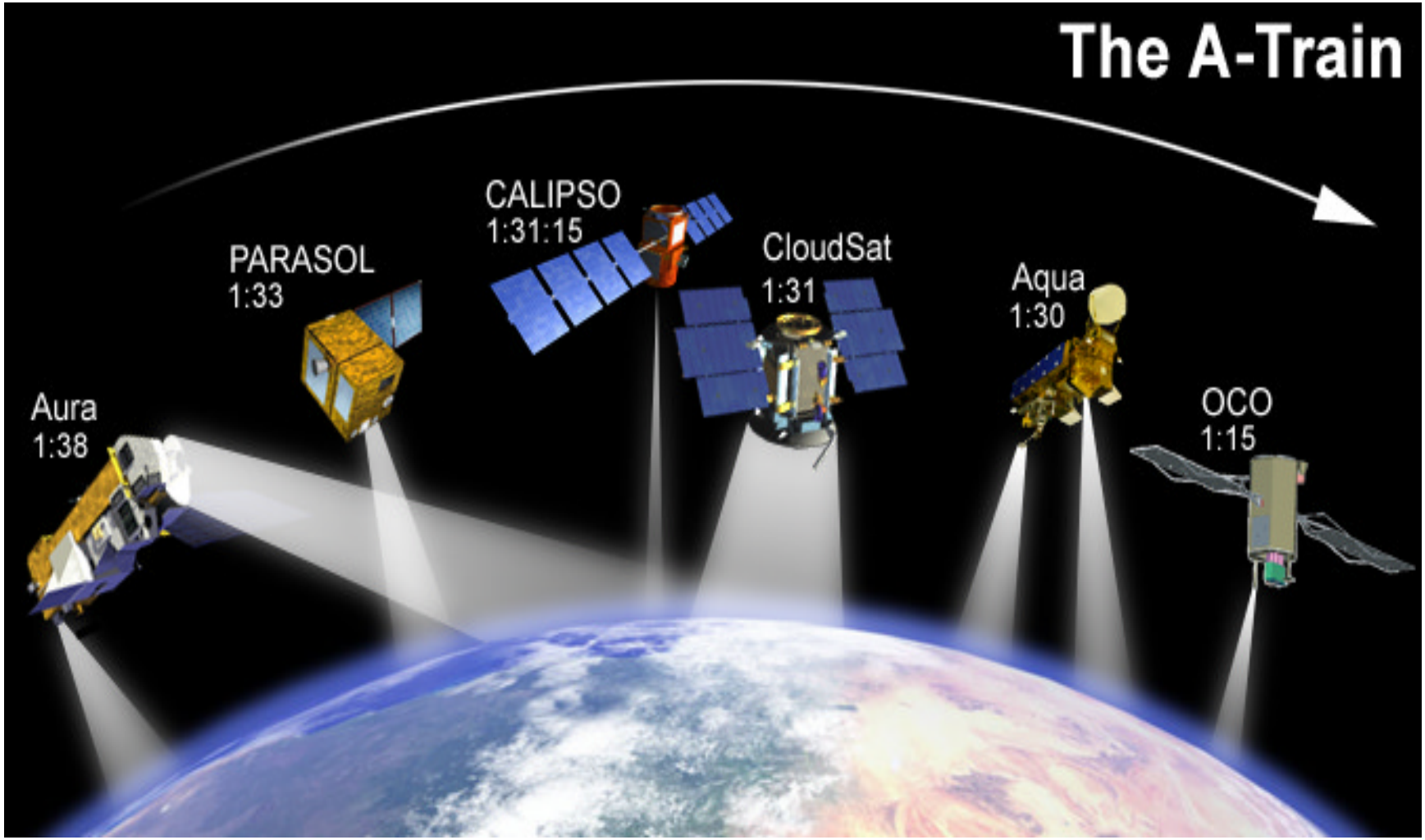
- **Transition SORCE and ICESat to on-orbit operations**
- **Prepare for Aura launch and operations**
  - Spacecraft test today
  - Planning for January 04 launch
- **Continue CSOC to MOMS transition**
  - Space moves and reconfiguration
  - Property issues
- **Continue Space Operations Institute efforts**
  - Initiating test bed

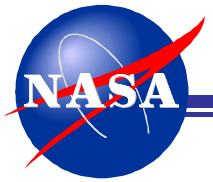


Constellation Management

- **Aqua/Aura/Calipso/Cloudsat/Parasol/ Orbiting Carbon Observatory**
- **International constellations**
- **Main issue is control box size and phasing of inclination maneuvers**

Constellations



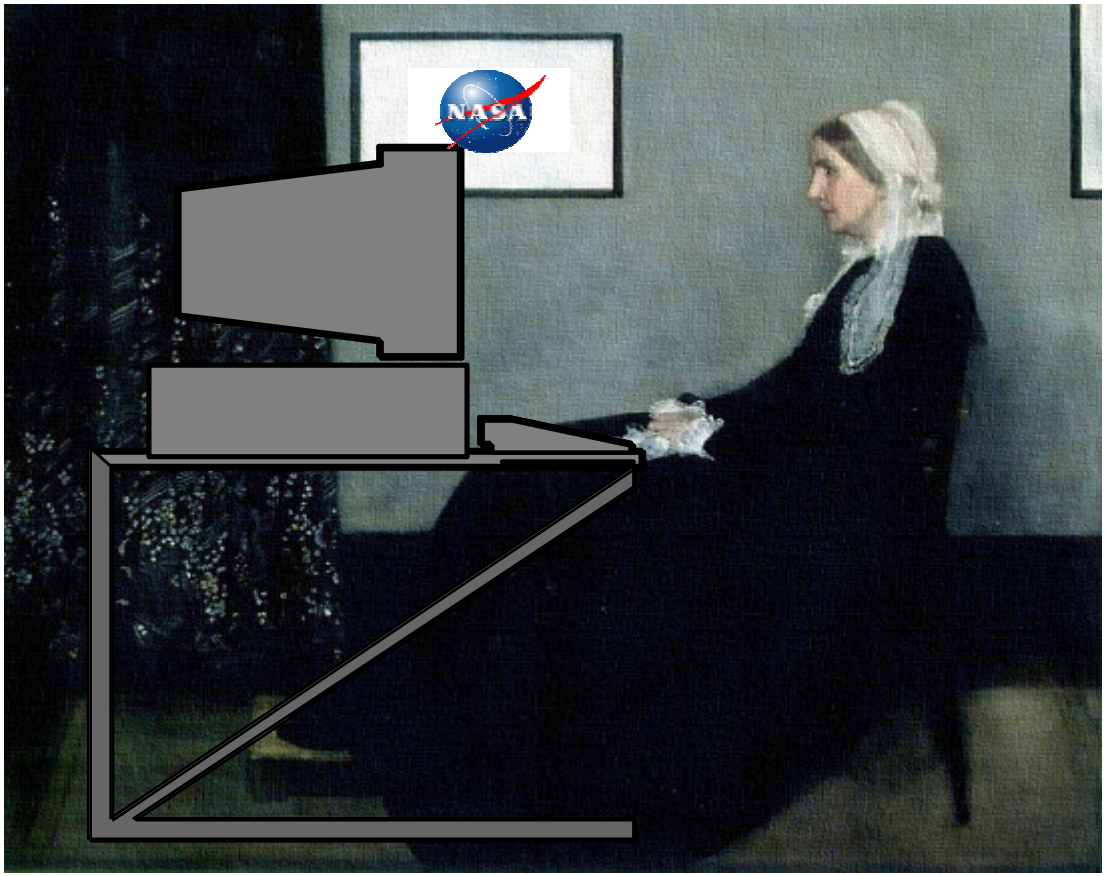


Space Science

R. Sodano

Code S Missions

Mission Operations and Mission Services Contract (MOMS)



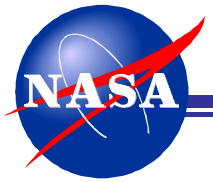
Agenda

- **Lessons Learned**
- **Schedule**
- **MOMS Scope**

Please email any MOMS questions to the Contracting Officer: Carlos.R.McKenzie@nasa.gov; NO QUESTIONS WILL BE ADDRESSED DURING THIS PRESENTATION

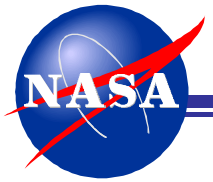
Lessons Learned Applied to MOMS

- **Mission Set is not part of the contract**
  - Indefinite Delivery Indefinite Quantity contract
  - Task orders with individual performance periods based on project needs (e.g., Sr. Review 2 yr cycle)
- **In order for work to be performed it must be in a government generated task order**
  - Each task order has its own Statement of Work which has to fall within scope of the contract Statement of Work
- **Non exclusive**
  - Government may chose to acquire any of the services within the MOMS scope using other contract vehicles if that is in the government's best interest
- **Task Orders will be Performance based to the extent feasible**
- **Cost will be reported against each task order WBS using 533's**
- **Single contract award, cost plus award fee**



Schedule

- **Draft RFP available now**
  - http://www.hq.nasa.gov/smcds/
- **Final RFP will be released on April 11th**
- **Site visits held last week**
- **Contract award in late 2003**
- **Transition from CSOC complete 3 months after award**
- **5 year contract**
- **2 year option to allow flexibility in transitioning missions to subsequent effort**

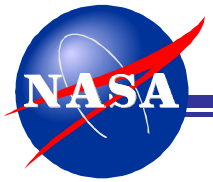


Scope

- **Flight Operations**
- **Mission Data Collection & Distribution (including EDOS)**
- **Mission Services Integration**
- **Systems Engineering & Development Tasks**
- **Flight Dynamics Support Services**
- **Flight Dynamics Systems Engineering**
- **Mission Analysis and Operations Support**
- **Systems Administration**
- **Mission operations and flight dynamics technology development and infusion**
- **Mission communications support (voice, video, network management)**

SCOPE: Flight Operations

- **Code Y on-orbit Missions (most likely)**
  - TRMM
  - Terra, Aqua, and Aura to transition to MOMS 90 days after Aura launch
  - EO-1
- **Code S on-orbit Missions (most likely)**
  - SOHO, RXTE, Wind, TRACE, ACE, Polar
- **HST computer operations support**
- **New Missions: Specifically which new missions will use the contract is TBD**



SCOPE: Mission Data Services and Distribution

- **EDOS**
- **Pacor-A**
- **Level zero processing performed in MOCs**
- **Level 1 processing**

SCOPE: Mission Services Integration

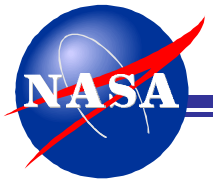
- **Sustaining Engineering**
  - Software, hardware, data bases, configuration management
- **Systems Engineering**
  - Reviews, interfaces, risk management, mission systems engineering
- **Best Practices**
- **Facilities management**
- **Customer support to Code 450**
- **Logistics**

SCOPE: Systems Engineering and Development

- **Engineering studies**
- **Mission system development**
- **Technology development**
- **Integration and test**
- **Systems administration (for example, for labs)**

SCOPE: Flight Dynamics

- **Technology Development**
  - Automation, formation flying, advanced navigation, mission design
- **Systems Engineering**
  - Software development and maintenance
  - System facilities planning and design
- **Mission Analysis and Operations**
  - Spacecraft operations support
  - Mission Planning and design
  - Orbit determination and analysis
  - Acquisition data
  - Product generation
  - Maneuver planning
  - Attitude determination, control and analysis
  - Manned flight support
  - ELV Support
  - SN Support
- **The GSFC/AETD Flight Dynamics Analysis Branch will have a leadership role in flight dynamics operations in addition to development**

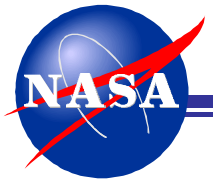


SCOPE: Information Services and Mission Operations Communications Support (Code 290)

- **Communications systems maintenance**
- **Network analysis**
- **Voice and video**
- **Nascom security control**
- **Technical control and data switching**
- **Conversion device service**
- **Mission operations integration and planning**
- **Nascom network scheduling**

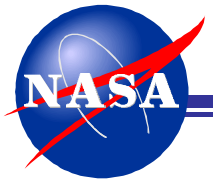
Human Spaceflight

T. Sobchak
NASA Network Director for Human Spaceflight
Goddard Space Flight Center, Code 451



Agenda

- **STS-107 Columbia Contingency**
- **STS-107 Network Support Results**
- **CANDOS Support for STS-107**
- **AFSCN RTS Support**
- **Columbus Terminal (Col-T)/JEM Ka-band TDRSS Support**
- **ISS Downlink Enhancement Architecture (IDEA)**
- **Network Support Group (NSG)**



STS-107 Columbia Contingency Summary

- **All Network sites and supporting elements were released from configuration freeze by February 27, 2003.**
- **All data at GSFC and Network sites/supporting elements was impounded in a timely and organized manner.**
- **All requests for access to impounded data were completed quickly and in accordance with established procedures.**
- **The GSFC HSP STS-107 Data and Record Handling Guidelines document was developed within two weeks after the contingency and approved by CCB two weeks later.**
- **The GSFC STS-107 Network Team responded to 73 action items during the four weeks following the contingency.**

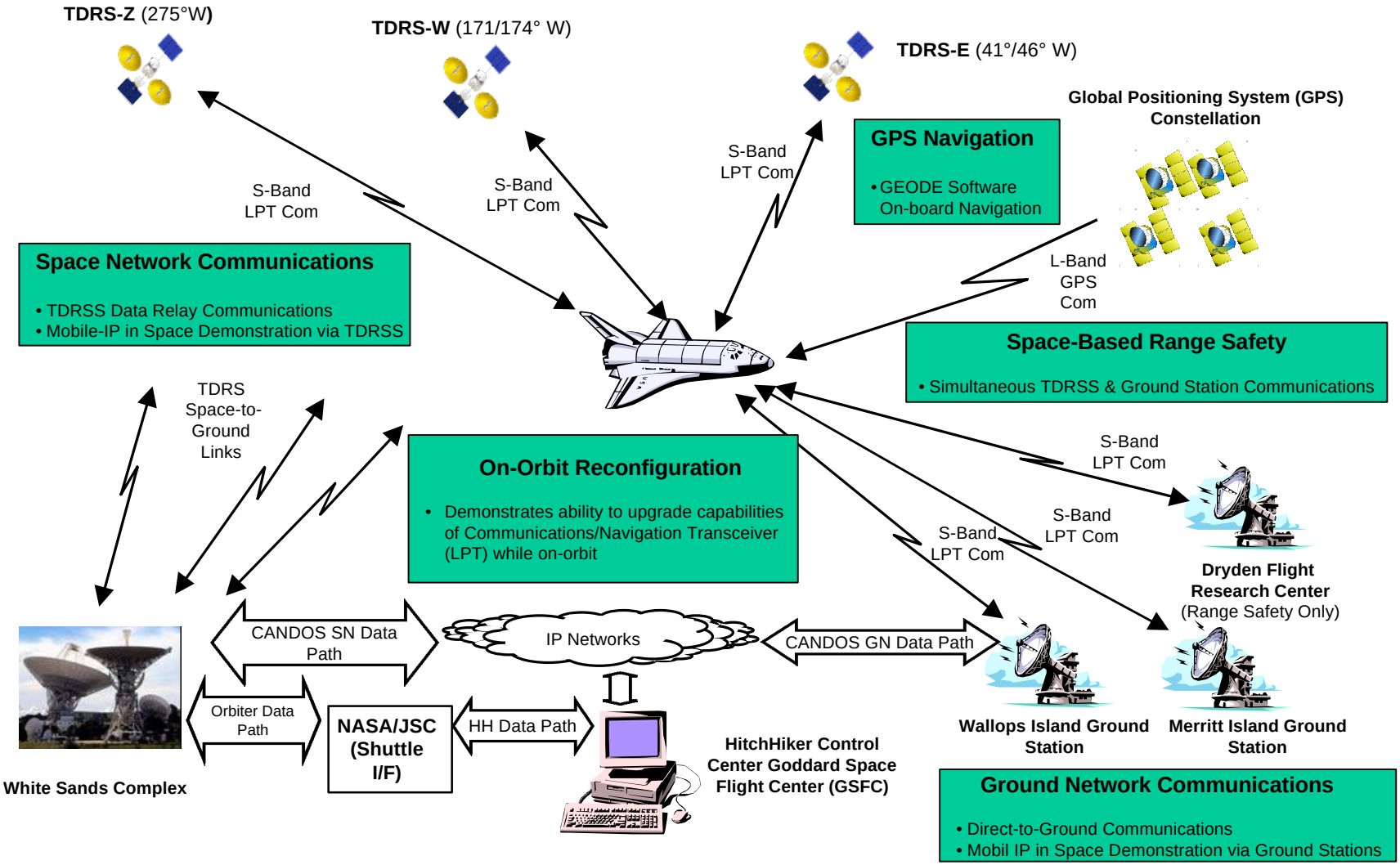
STS-107 Network Support Results

- **SPACEHAB support via SN included 48 Mbps high rate dump data.**
- **Stat Mux equipment installed at GSFC in mid-October for 48 Mbps DTV data for HH MEIDEX payload.**
  - Digital TV Ground Support Equipment loaned to GSFC/HH by JSC.
  - Stat Mux upgrade (GE2 Transponder 5) transitioned from analog to digital modems provided reliable support.
- **FREESTAR support was provided for the standard low rate interleaved commanding with strip and ship telemetry.**
- **CANDOS independent communication links were supported by the SN, Wallops, MIL, and Dryden.**
  - Highly successful demonstration of new communication technologies and operations concepts.
- **One In Flight Anomaly (IFA) assigned due to STGT DIS ADPE Failover**
  - WSC Data Interface System (DIS) failovers and NLIC card configuration issues caused impacts to service over 2hr 11min time period.
  - Presented to the Space Shuttle Program (SSP) Program Control Review Board (PCRB) and IFA closed.

CANDOS Support for STS-107

- **The Communications and Navigation Demonstration on Shuttle (CANDOS) flew as an experiment on the FREESTAR Hitchhiker payload on STS-107.**
- **The CANDOS Experiment showcased the integrated communications and navigation functions of the Low Power Transceiver (LPT), a modular, software programmable, multi-band, multi-channel transceiver developed by NASA/GSFC and ITT Industries under sponsorship of the NASA Office of Space Flight.**
- **The CANDOS experiment provided the on-orbit demonstration of six payload objectives: TDRSS Communications, GN Communications, GPS Navigation, On-Orbit Reconfiguration, Space Based Range Safety, and Mobile IP – capabilities anticipated to be needed to enable the next generation of space missions.**
  - 97 SN events (52 hours) and 37 GN events (6 hours) were supported
  - 89% of events were fully successful
- **All experiment primary and secondary goals were met or exceeded and all data was downloaded prior to the tragic loss of STS-107 and crew during landing on February 1, 2003.**

CANDOS Support for STS-107



LPT CANDOS Mission Results Summary

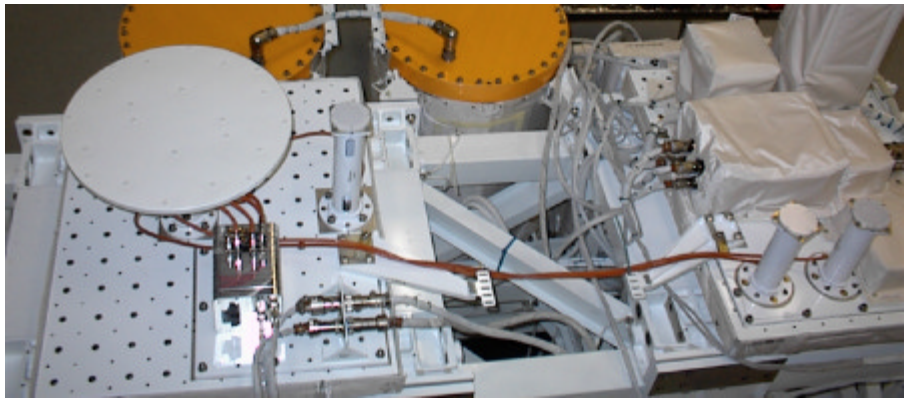
- **LPT CANDOS met or exceeded all primary and secondary goals during STS-107 flight**
- **SN/GN Communications**
  - 134 Communications Events (about 60 hours contact time)
  - Only 3% of the events unsuccessful – none due to LPT RF failure (mostly configuration issues)
- **GPS/Navigation**
  - Four GPS events occurred during the mission (a minimum of 2 hours of consecutive time without Shuttle attitude maneuvers)
  - Position difference within the uncertainty of the JSC vector ranging from 25 to 250 m
  - The Navigation Filter (GEODE) measurement residuals were generally well within +/- 20 m over each 2-orbit experiment, indicating that GEODE is meeting its performance expectations (20 m 1-sigma).

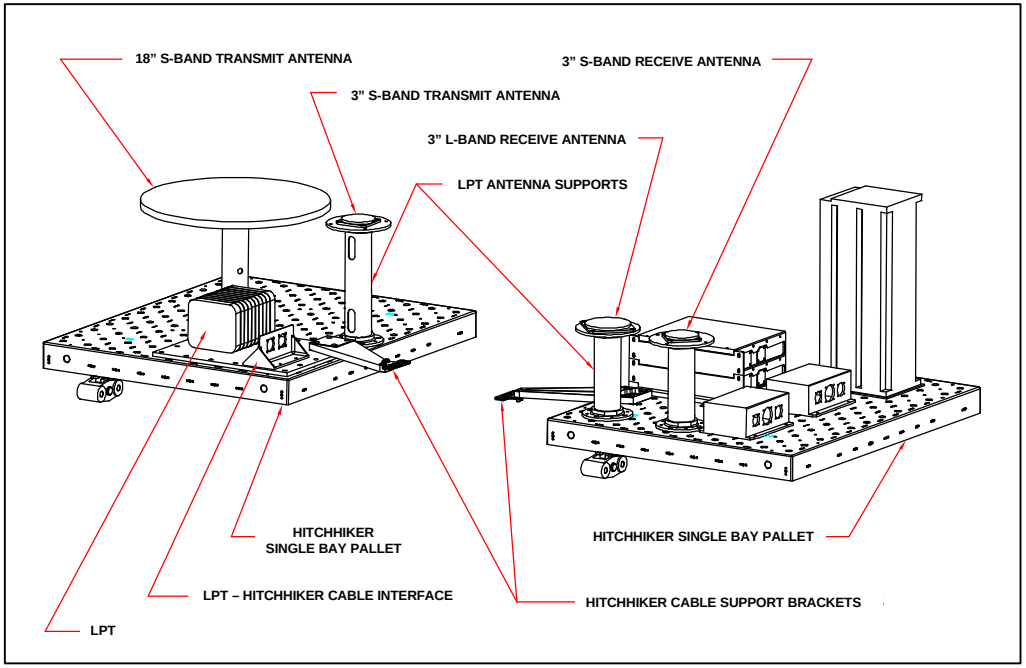
LPT CANDOS Mission Results Summary (cont'd)

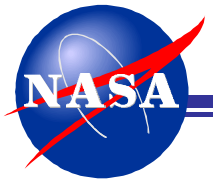
- **Range Safety**
  - 12 Range Safety events total
  - First ever use of TDRSS Forward Link from ground station (Dryden)
  - Six events had simultaneous links from Dryden and TDRSS
  - All events were successfully able to close the link and flow error-free packet data.
- **Mobile IP/IP-in-Space**
  - All operations have been conducted according to the GSFC IT Security Branch approved CANDOS security plan.
  - Mobile IP utilized on all two-way SN and GN passes. Routers and Mobile IP support provided by Glenn Research Center.
  - The standard off-the-shelf IP stack built into the on-board COTS operating system supported all data communications.
  - Demonstrated mission operations using IP standard methods for command, telemetry, and file transfer operations.
  - Demonstrated advanced ops concepts enabled by IP

LPT CANDOS Mission Results Summary (cont'd)

- **On-Orbit Reconfiguration**
  - Two on-orbit reconfigurations of the LPT Digital Signal Processing (DSP) were performed
- **Educational Outreach**
  - Ten different schools and organizations provided "test files" for use during the CANDOS experiment
  - These files included pictures, drawings, or signatures of students from places as close as local schools and as far away as England.




18" S-BAND TRANSMIT ANTENNA
3" S-BAND TRANSMIT ANTENNA
3" L-BAND RECEIVE ANTENNA
LPT ANTENNA SUPPORTS
3" S-BAND RECEIVE ANTENNA
HITCHHIKER
SINGLE BAY PALLET
LPT – HITCHHIKER CABLE INTERFACE
LPT
HITCHHIKER SINGLE BAY PALLET
HITCHHIKER CABLE SUPPORT BRACKETS

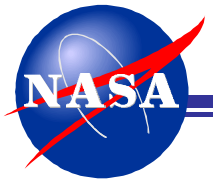


AFSCN RTS Support

- **Interface for RTS support is transitioning from OAS to Shriever AFB (part of BRAC).**
- **AFSCN has not provided NASA with an official cost estimate for transition, but informal estimates have been very high, plus potential recurring costs.**
- **JSC MOD determined that RTS is desirable, but ops can be accomplished with TDRS and NASA sites.**
- **Presently, NASA does not intend to transition to Shriever AFB**
  - No interface to RTS sites planned
- **Current agreement has been extended with OAS to provide support through March 2004.**

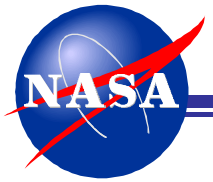
Columbus Terminal (COL-T) Ku-Band/ JEM Ka-Band TDRSS Support

- **ISS Ku-Band system is single string – no backup if there is a system failure.**
- **Columbus has a plan for standard interface with the ESA Artemis relay satellite using Ka-Band and via the ISS Core.**
- **Due to a launch vehicle problem, the Artemis was not placed in the correct orbit at launch. This required excessive use of propellant resulting in a decrease in the expected lifespan which was expected to be 7 years starting in 2003.**
- **ESA now working to establish a Columbus backup support plan via TDRSS.**
- **Astrium (ESA Columbus prime contractor) has contacted GSFC SN Project Office to investigate the use of a direct TDRS interface for Columbus using Ka-Band with the new fleet of TDRS.**
- **TDRSS initially requested as Artemis backup. A prime support role is possible in 2009/2010.**
- **COL-T/TDRSS signal compatibility and Spectrum Management issues being investigated.**



Columbus Terminal (COL-T) Ku-Band/ JEM Ka-Band TDRSS Support (cont'd)

- **JSC ACWG is working agreements with NASDA similar to COL-T for Japanese Experiment Module (JEM) Ka-Band support.**
- **JSC Advanced Communication Working Group (ACWG) is working with NASDA on agreements for use of their JEM as backup to ISS Ku-Band interfaces.**
- **Data would be routed from the US onboard Ka-Band systems to the JEM Ka-Band avionics.**
- **Use of JEM Ka-Band would be during periods when the NASDA system interface is not in use.**
- **JEM/TDRSS signal compatibility questions being worked.**



ISS Downlink Enhancement Architecture (IDEA)

- **IDEA is a ground systems infrastructure that will provide the ISS Program the ability to enhance its science return from 50 Mbps to 150 Mbps over the Ku-Band downlink and reduce operations, NISN communications link, and sustaining engineering costs.**

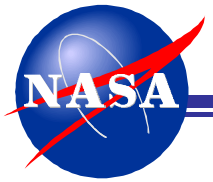
- **The main objectives of IDEA are to replace the existing DOMSAT commercial and implement common FEP architecture at WSC and feed JSC and MSFC unique components at ISS downlink rates up to 150 Mbps. This will be done in two phases.**

  – Phase 1 is to replace the existing DOMSAT commercial satellite transponder service that distributes the Ku-Band downlink from the WSC to both JSC and MSFC with a fiber terrestrial communications network. The DOMSAT service contract expires 11/15/03.

  – Phase II is to deploy the Functionally Distributed Processors (FDP) at WSC. Deployment of the FDPs will move the front end processing of the Ku-Band downlink from JSC and MSFC to WSC.

- **IDEA CDR was held on 03/13/03.**

- **Phase 2 Operations Readiness Review is scheduled for 9/30/04.**

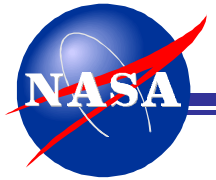


Network Support Group

- **Network Support Group (NSG) is a consolidation of the Network Support Committee (NSC), Post Mission Review (PMR), and the Network Operations and Integration Group (NOIG) into one entity.**
- **The NSG provides an integrated approach to highly reliable, top quality network services to Human Space Flight programs.**
- **The NSG provides the forum for a comprehensive review of previous missions, engineering and operational issues, long term planning policy, and requirements.**
- **The NSG is chaired by the GSFC Network Director with participation from the NASA field centers and integrated network sites/elements supporting the Human Space Flight program.**
- **Next scheduled NSG meeting will be held at JSC on March 26 and 27, 2003.**

Launches Status

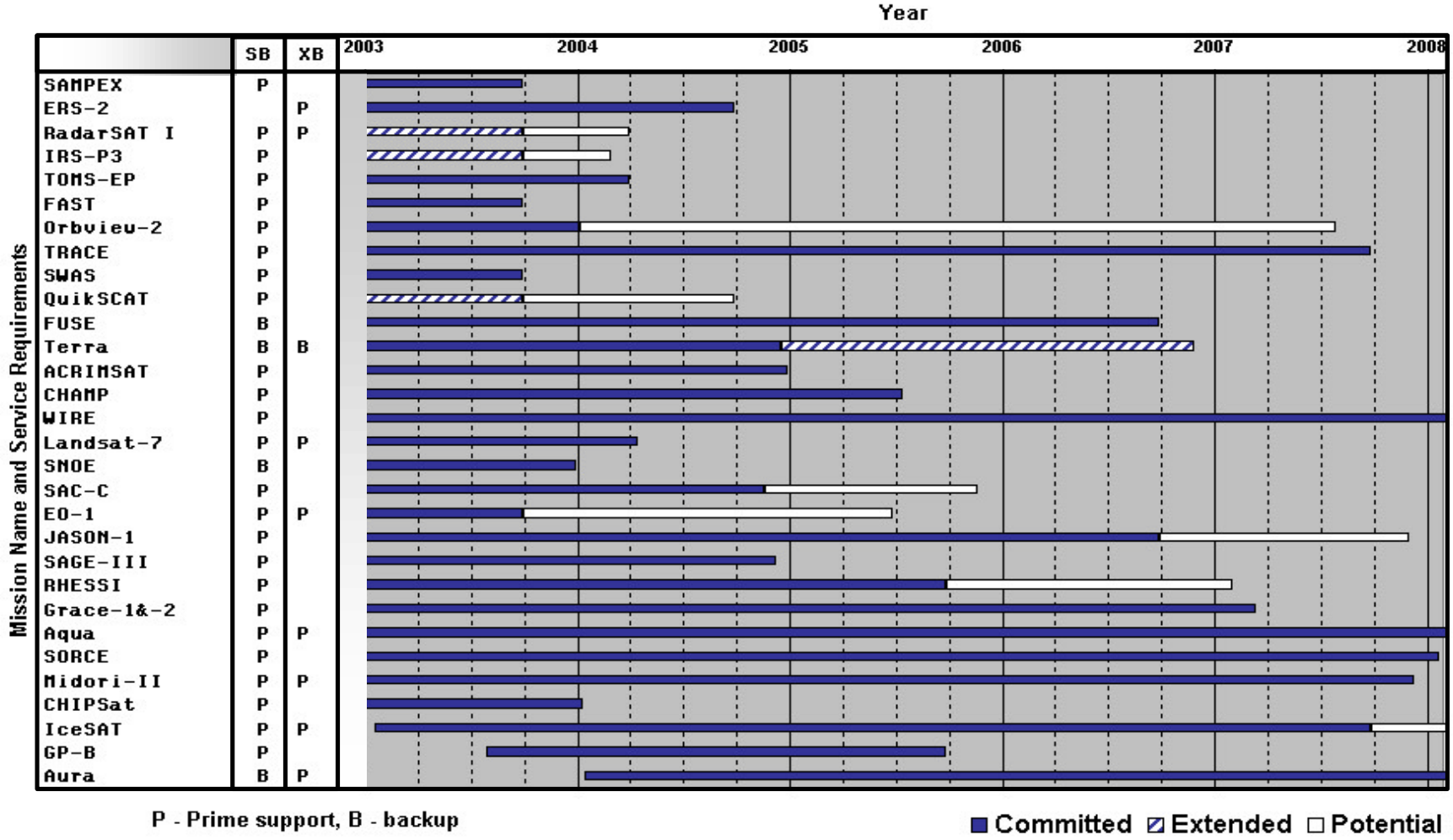
(within L -1 yr)



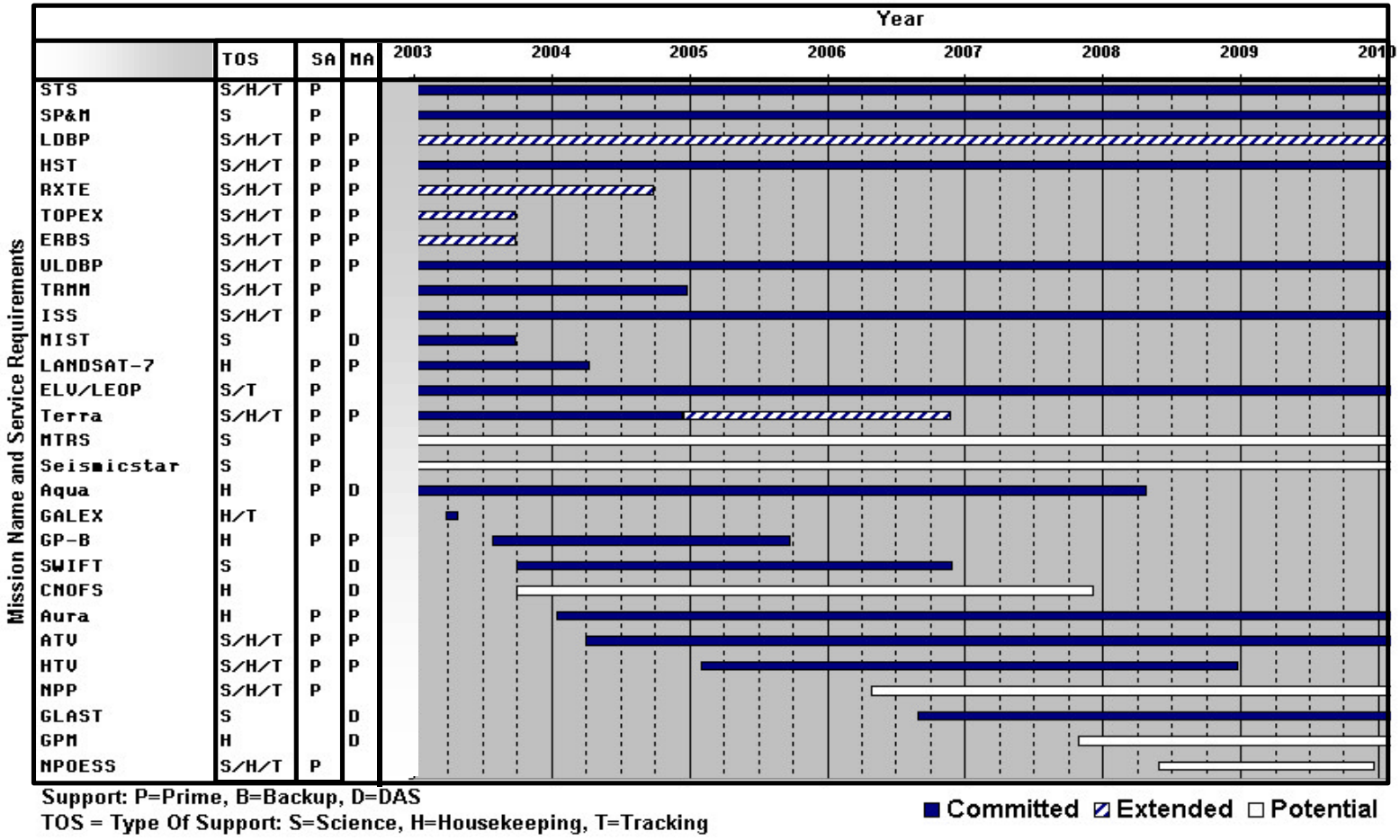
Loading / Resource Issues

A. Levine, NASA Code 451
Service Planning Manager

GN Mission Model (2003 through 2007)

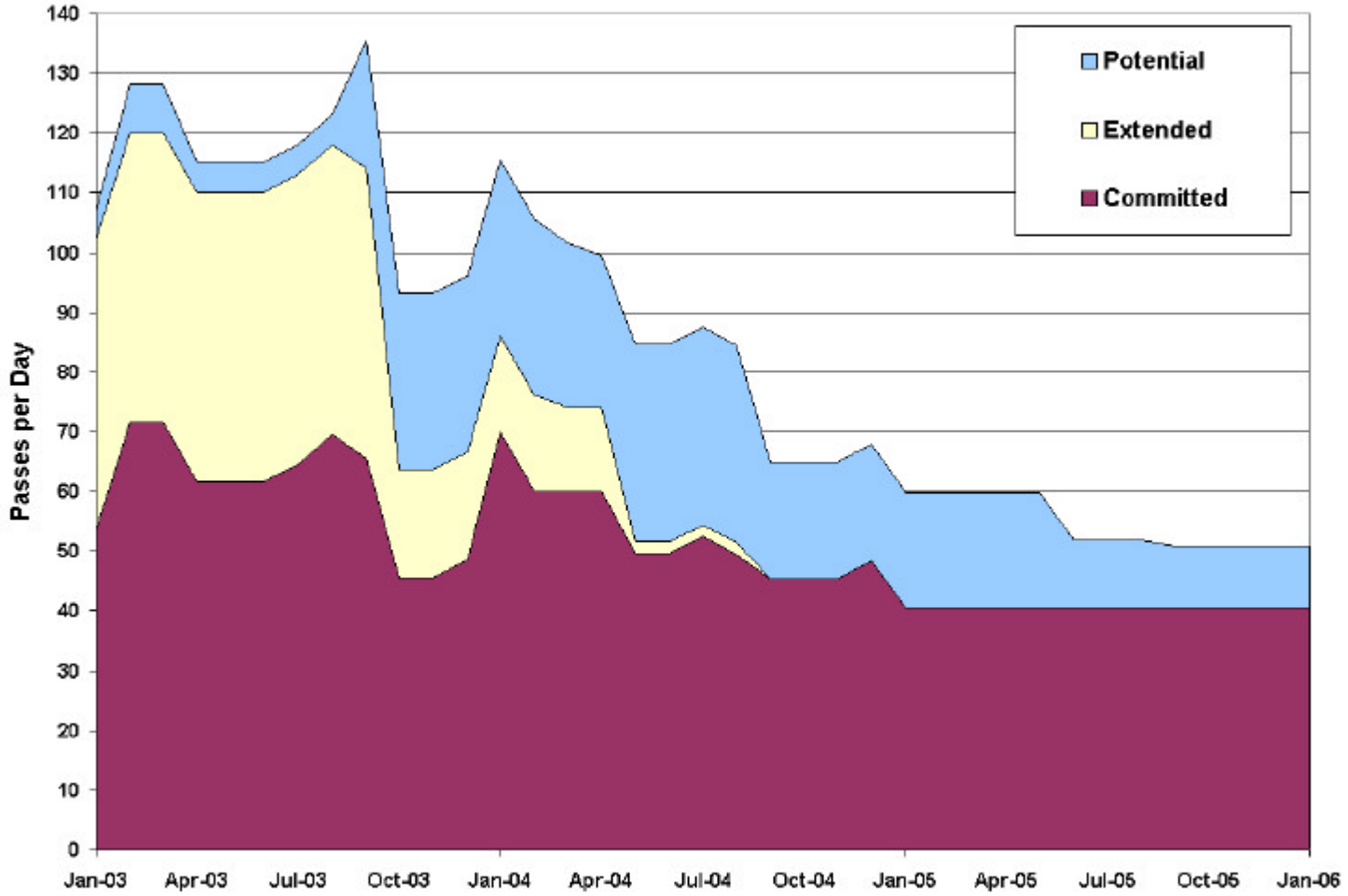


SN Mission Model (2003 through 2009)

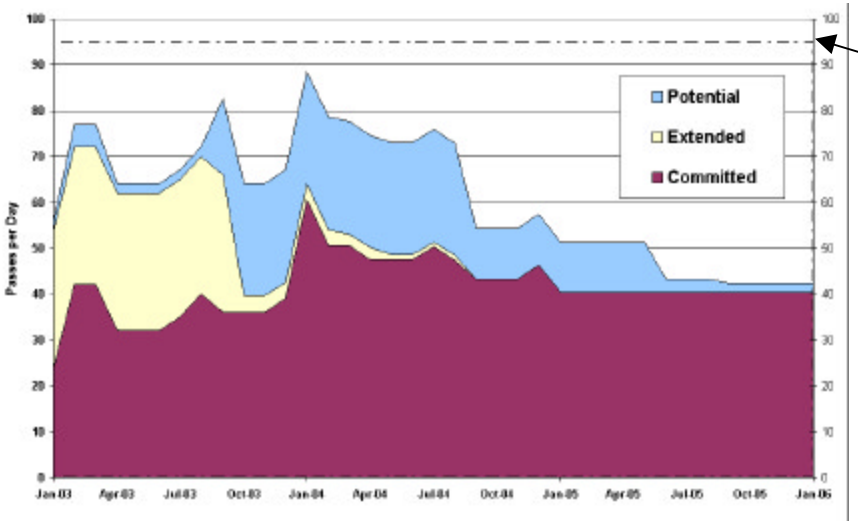


Note: ATV support runs for 6 months and off for 12 months

GN Load Forecast

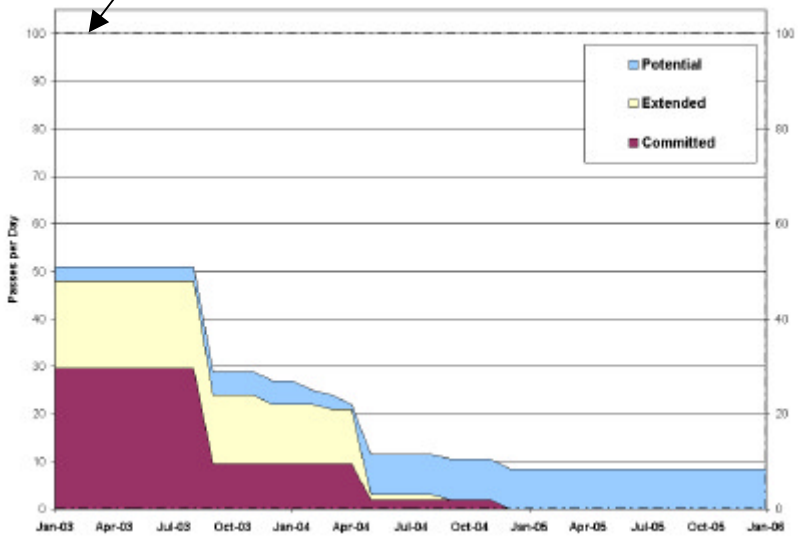


GN Antenna Load Forecasts



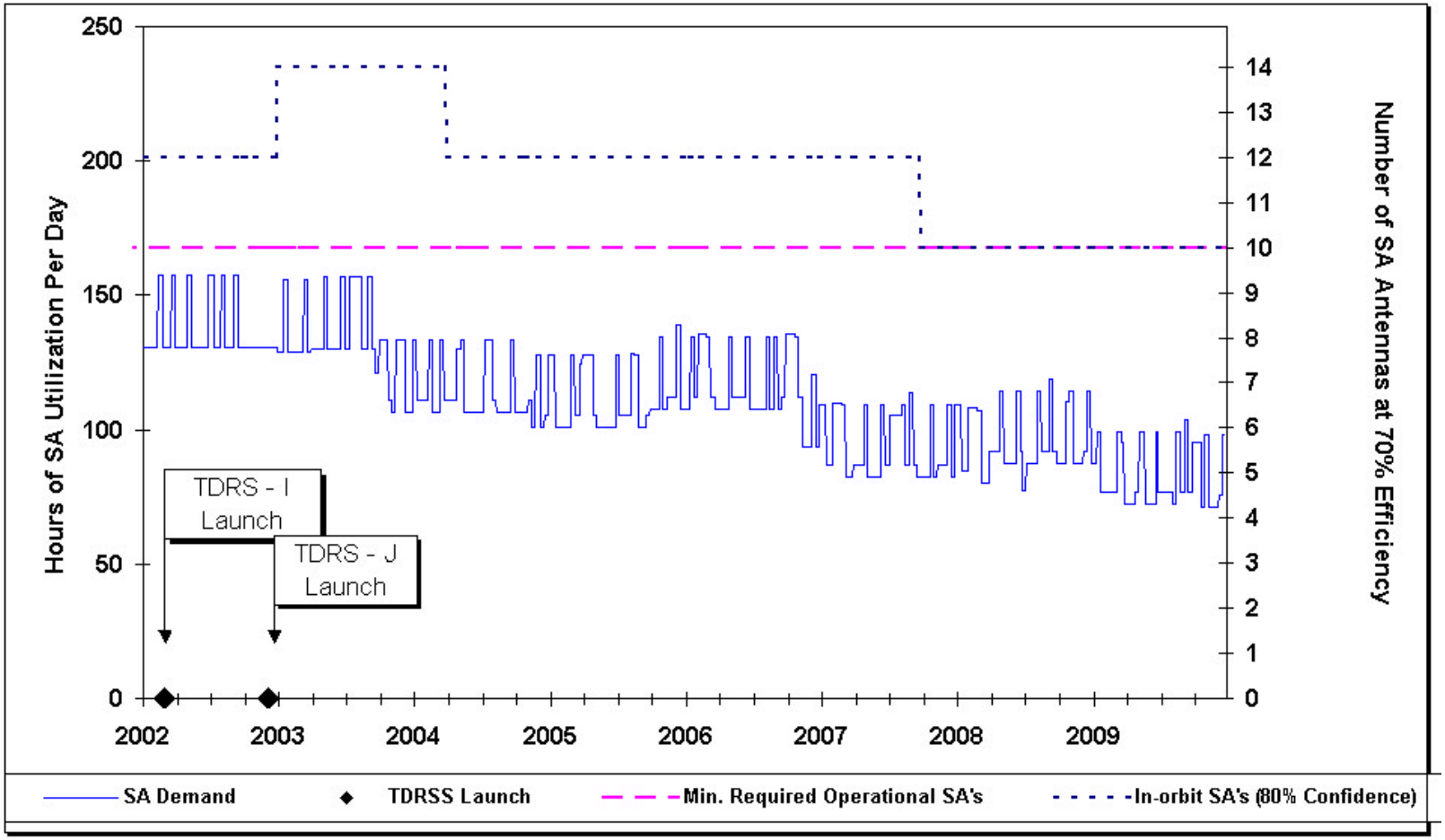
11 Meter Antennas

Maximum Utilization

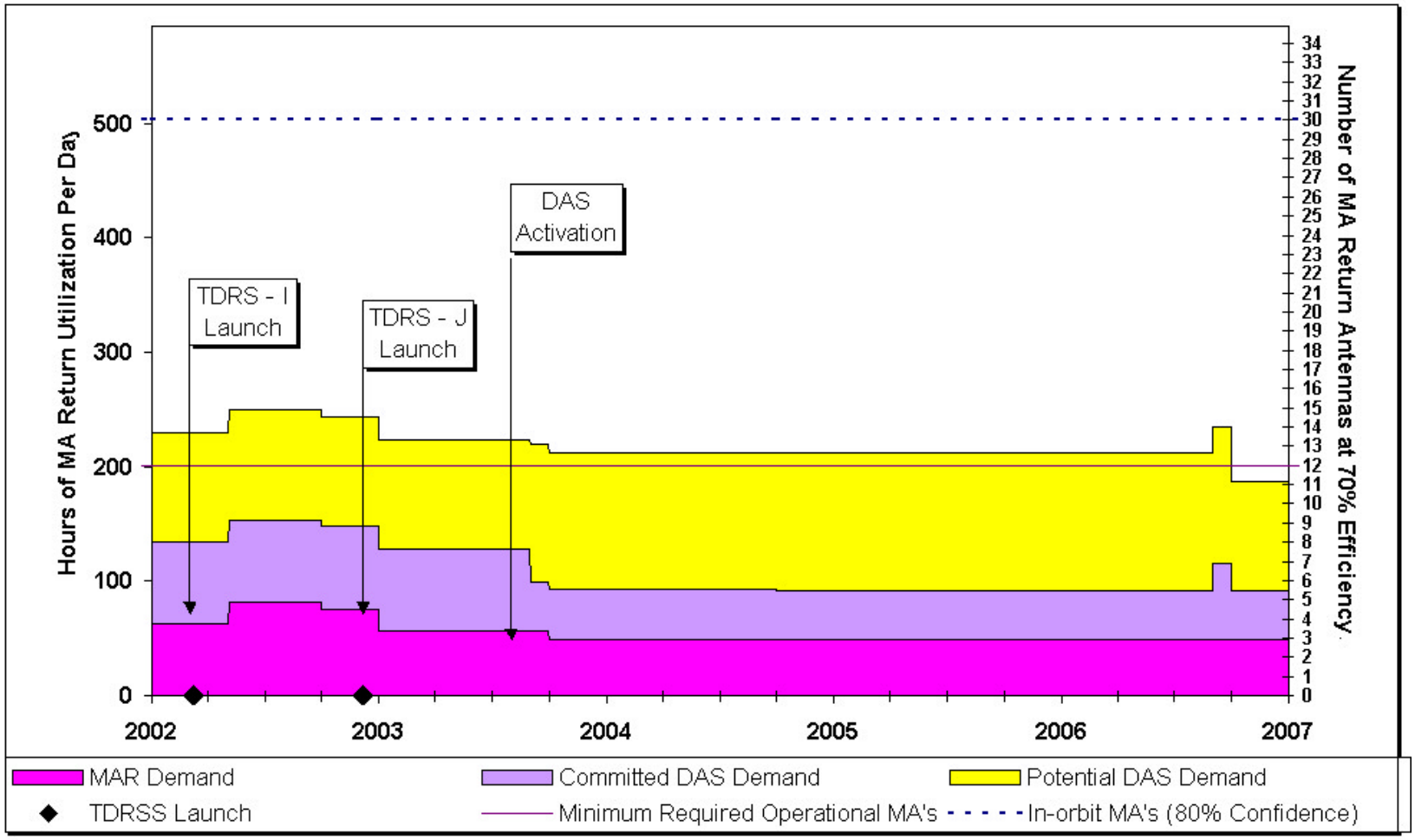


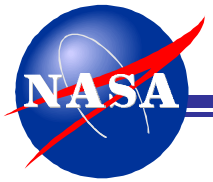
5/8 Meter Antennas

SN SA Load Forecast



SN MAR Load Forecast





Meeting Customer Commitments

- **Both GN and SN customer support resources will be sufficient to meet current CSOC Mission Set commitments under most conditions**

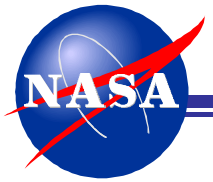
- **There will be certain periods of time for both the GN and SN during which contention for resources will occur**

  – Infrequent 11 meter antenna failures likely to produce moderate resource contention

- **Better service planning continues to require more timely and complete detailed ground service requirements from the customers, including periodic updates that reflect service level changes**

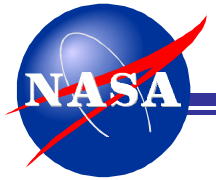
GN Support Impact Issues

- **High priority support (launch and early operations, spacecraft emergencies, targets of opportunity, etc.) creates short periods of time where some impacts to other spacecraft nominal support requirements may be encountered**
  - Tendency for critical support/LEOPs to overlap
    - e.g., ADEOS-II and GRACE-1 on Wallops 11 meter antenna
  - Upcoming GP-B early lifecycle has multiple critical support periods for on-board gyro spin-up and calibration
    - Further launch delays could push that support into the Aura LEOP timeframe
- **Spacecraft extensions have helped keep overall S-Band support at high level**
  - Extended QuikSCAT support (potential to 9/30/04) through upcoming Aura support period was not originally forecast



SN Support Impact Issues

- **Continued increase in launch (and early orbit) support customers requesting near continuous SA link support for several hours and significant dual (simultaneous) SA support**
  - Current NASA policy is to establish minimum requirements and perform assessment on case-by-case basis
    - Second SA link generally scheduled ‘as available’ NET 48 hours prior to launch
  - Customers are being encouraged to acquire separate radar coverage (NASA or elsewhere) if second SA is to meet ‘tracking’ requirements, e.g., difference Doppler



New Action Items